

UNIVERSITY OF ILLINOIS Agricultural Experiment Station

BULLETIN NO. 128

TEN GENERATIONS OF CORN BREEDING

BY LOUIE H. SMITH



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SUMMARY OF BULLETIN NO. 128

I.. The results of ten years experiments in breeding corn to modify the composition of the grain and thereby adapting it to various special purposes are here reported.

2. Starting with a variety of average composition, it has been possible by selection and breeding, in ten generations: (1) to increase the average protein content from 10.92 to 14.26 percent; (2) to decrease the average protein content from 10.92 to 8.64 percent; (3) to increase the average oil content from 4.70 to 7.37 percent; (4) to decrease the average oil content from 4.70 to 2.66 percent. In other words, out of a single variety of corn two strains have been developed of which one is now almost twice as rich in protein as the other, and two other strains have been developed, one of which is now nearly three times as rich in oil as the other.

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3. Variations among individual ears have been found ranging in protein content from 6.13 percent in the low-protein strain, to 17.79 percent in the high-protein strain, and in oil content from 1.60 percent in the low-oil strain to 8.59 percent in the high oil strain. Page 489.

4. Climatic conditions exert, in certain years, a marked effect upon the composition of the corn crop as regards its protein, oil, and starch content. Page 469.

5. Altering the composition of the grain has produced no very marked effect upon the composition of other parts of the corn plant. Page 476.

6. Continued selection appears to have induced a certain correlation between protein and oil content. Page 483.

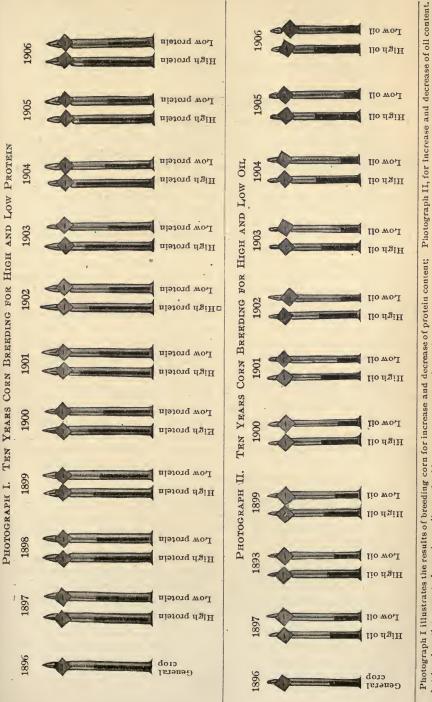
7. Selection for the composition of the grain has resulted in characteristic types of kernel. Page 484:

8. Perceptible modifications in the type of ear have likewise been wrought. Page 485.

9. Selection for high-protein is evidently accompanied by a reduction in yield. In the other strains the yields for the most part have been maintained in spite of the rigorous selection for the special chemical characteristics. Page 485.

10. The detailed plot records of each of the four strains and the analytical results of nearly 5000 individual ears which have been analyzed during the ten years' work are placed on record in the appendix to this bulletin in such arrangement that the maternal pedigree record of every ear is shown. Page 490.

11. These four breeding plots are still being continued.



The bottles show the amount of protein or oil contained in one-tenth bashel of corn from the crop of the different strains each season for the first ten generations.

INTRODUCTORY NOTE

BY CYRIL G. HOPKINS, CHIEF IN AGRONOMY

In 1896 the Illinois Experiment Station began the improvement of corn by varying the composition of the grain through selection and breeding. The results of the first two years of these investigations were published in Bulletin No. 55 "Improvement in the Chemical Composition of the Corn Kernel." This same work has been carried on continuously since that time, and although several publications have been issued in the meantime bearing upon different phases of the subject of corn improvement as it has been developed, including Bulletins 82, 87, 100, and 119, there has, however, been no complete report published of the results obtained in the progress of this original line of work described in Bulletin No. 55.

It is the present purpose therefore to present the results which have been obtained, in the first ten generations, in improvement in composition in various directions, namely, for high protein, for low protein, for high oil and for low oil, of the single variety of corn from which these four different strains have been produced, and which is known as "Illinois" corn.

Since the discovery of the possibility of improving corn for special adaptation and the general recognition of its importance, this Station has extended its work to other standard varieties of corn best adapted to different sections of the state, applying the methods and principles worked out in the original experiments with the "Illinois" variety. This work of improving the other standard varieties both for yield and for special adaptation is being carried on largely in co-operation with seed corn breeders of the state. A large amount of data relating to this later work has already accumulated, but it is proposed to reserve this for future publication rather than to attempt to cover in this report all of the corn breeding work now in progress believing that such a division of the subject will allow a clearer presentation.

Inasmuch as the editions of Bulletins 53 and 55 are already exhausted and the demand for the information contained therein is still unsatisfied, it is proposed to make the nature of this report as complete a presentation of the investigation as is possible without making too great repetition of material already published.

For several years Professor Louie H. Smith has been largely responsible for the conduct of these investigations, valuable assistance having also been rendered during recent years by Doctor E. M. East, now agronomist at the Connecticut Experiment Station, Mr. R. W. Stark, now chief chemist for the Cuban Experiment Station, Mr. H. Love, and Mr. C. H. Myers.

TEN GENERATIONS OF CORN BREEDING

BY LOUIE H. SMITH, ASSISTANT CHIEF IN PLANT BREEDING

IMPORTANCE OF CORN IMPROVEMENT

Aside from the purely scientific interest attached to this work, the practical importance of improvement of corn to adapt it for special purposes as well as for increased yield is now becoming generally recognized. The significance of improving the chemical composition of corn has already been pointed out in Bulletins 55, 82, 87, and 100 of the Illinois Experiment Station, and it is scarcely necessary to dwell upon this phase of the subject further than to refer briefly to some of the demands for corn improved along these particular lines.

No other crop is made to serve such a variety of purposes as corn, and in consideration of these many different uses is suggested the question of special adaptation.

Purpose of increasing the protein.—In the nutrition of man and beast protein is the most expensive nutrient. Of all of our American food stuffs corn is the cheapest, because of its economical production. But because corn does not contain sufficient protein for most purposes of feeding, it must be re-inforced by other more expensive food stuffs in order to obtain the proper ratio of this important nutrient. It is from these considerations that farmers, and especially stock feeders, recognize the importance of breeding corn for increase of protein content.

Purpose of decreasing the protein.—On the other hand, there is a demand from the manufacturers of those products which are derived from the starch of corn such as glucose, gum, dextrine, syrup, and alcohol, for a corn having a large proportion of carbohydrates and not so rich in protein. The practical effect of decreasing the percent of protein is to increase the percent of starch; therefore, for such purposes there should be a place on the market for corn which is bred for decrease of protein content.

Purpose of increasing the oil.—The oil of corn has in recent years found such a wide commercial use that under the present market conditions, it has become, pound for pound, by far the most valuable constituent of the grain, and whereas formerly in the glucose factories and corn mills the germs containing the oil were

almost a waste product, there is now an actual demand on the part of these industries for corn which is richer in oil. It is proposed to meet this demand by breeding corn for increase of oil content.

Purpose of decreasing the oil.—There is also a practical use for corn with a low oil content. It has been found by investigation that in feeding swine, the oil in the corn tends to produce a soft, flabby quality of flesh which is very undesirable, especially for our export trade where the demand of the market is for a hard, firm product. A remedy for this lies in the reduction of the oil content of the corn which is fed. Thus here we have a very important practical object for breeding corn for decrease of oil content.

These special purposes mentioned for which corn is being improved suggest the possibility of many others demanded by the various industries which utilize the corn crop and which require different qualities in it.

Corn improvement should, of course, embrace quantity as well as quality and in all practical work of selection looking toward improvement, the matter of increased yield per acre should be given first consideration. Recognizing the importance of this principle, the methods used in these experiments have been chosen with the view of maintaining or increasing the yield, and productiveness is made the basis of the first selection, even sometimes at a sacrifice in percentage of the desired chemical constituent.

FUNDAMENTAL PRINCIPLES

Before taking up this work of the improvement of corn by systematic selection and breeding, it was necessary to make a preliminary study of the subject such as is reported by Doctor Hopkins in Bulletin 53 "Chemistry of the Corn Kernel." In this study a large amount of valuable knowledge was gained which bears upon the technical side of the work, such as the chemical principles involved and the laboratory manipulations upon which the success of the entire work so intimately depends. Further, important data were obtained from which were derived the principles of selection upon which all of this work in improvement of the composition of corn is based. All improvement by selection and breeding depends, of course, upon variation, therefore it was necessary to make a preliminary study in order to learn how corn varies with respect to its composition. As the result of such an investigation the following data were obtained :

Analysis of parts of the ear.—In studying this question 30 duplicate analyses were first made on different parts of ears. Five ears were divided lengthwise into 3 samples each in the following

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manner: If the ears were 12-rowed, 3 samples of 4 consecutive rows each were made; if 16-rowed, 3 samples of 5 consecutive rows each were made, one row being left, etc., etc.

Duplicate analyses of 15 samples thus prepared from 5 different ears gave the results shown in Table 1. The different ears are distinguished by the letters (a), (b), (c), (d), and (e).

TROM DIFFERENT LARS							
Sample & Ear.	Ash.	Protein.	Oil.	Carbohydrates.			
1 (a)	{ 1.42	10.79	4.57	83.22			
	{ 1.43	10.75	4.58	83 24			
2 (a)	{ 1.48	10.97	4.54	83.01			
	{ 1.47	10.94	4.51	83.08			
3 (a)	{ 1.50 { 1.51	$10.66 \\ 10.72$	4.53 4.55	83.31 83.22			
4 (b)	${1.51 \\ 1.52}$	12.00 11.98	4.60 4.59	81.89 81.91			
5 (b)	{ 1.49	12.01	4.57	81.93			
	{ 1.48	12.05	4.57	81.90			
6 (b)	{ 1.48	12.19	4.85	81.48			
	{ 1.47	12 08	4.80	81.65			
7 (c) •	{1.37	10.09	5.24	83.30			
	(1.37	10.10	5.17	83.36			
8 (c)	{ 1.31	10.14	5.08	83.47			
	{ 1.34	10.18	5.18	83.30			
9 (c)	{ 1.36 { 1.37	$10.15 \\ 10.20$	5.20 5.17	83.29 83.26			
10 (d)	{ 1.39	10.46	4.28	83.87			
	{ 1.38	10.46	4.29	83.87			
	{ 1.43	$10.25 \\ 10.27$	4.22	84.10			
11 (d)	{ 1.42		4.20	84 . 11			
12 (d)	{ 1.43	10.09	4.16	84.32			
	{ 1.45	10.06	4.15	84.34			
13 (e)	{ 1.34	11.19	4.80	82.67			
	{ 1.36	11.20	4.78	82.66			
14 (e)	{ 1.30	10.66	4.91	83.13			
	{ 1.28	10.62	4.89	83.21			
15 (e)	{ 1.36	10.81	4.83	83.00			
	{ 1.36	10.92	4.79	82.93			

TABLE I.—VARIATION IN COMPOSITION IN SAMPLES FROM THE SAME EAR AND FROM DIFFERENT EARS

1908.]

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These results indicate uniformity in the composition of different parts of the ear. The following shows the greatest total variation in the 6 single determinations of each constituent in any one ear; and also the total variation between the different ears.

	Ash. Protein.		Oil.	Carbohydrates.	
In any single ear.	. 09	.58	.28	.55	
In five ears	. 24	2.13	1.09	2.86	

Another lot of five ears was selected and each of these was divided crosswise into 3 samples of approximately equal amounts, which for convenience are designated "tip," "middle" and "butt," the ears being lettered (f), (g), (h), (i) and (j). The results of the duplicate analyses are given in Table 2.

It is observed that in every case the tip is the lowest in protein and that usually the middle is lower than the butt, the average total difference in the ear being 0.73 percent and the widest 1.13 percent as shown in the total variations following Table 2.

The variation in ash and oil is small and shows no such peculiarity. The carbohydrates, being determined by difference, appear, of course, as the complement to the sum of the other substances and show in the opposite direction approximately the variation of the most variable determinable constituent.

Partial analyses of single kernels.—For the work on ash content several ears of corn were selected, and from each a sample of corn, consisting of a number of rows of kernels and believed to fairly represent the ear, was taken and its percentage of ash in the dry matter determined. Then for special investigation of ash content of single kernels four ears from the lot were chosen, of which two were high and two low, comparatively, in percentage of ash as previously determined. From each ear 10 kernels were selected at approximately equal distance throughout the length of the ear, the kernels being numbered from 1 to 10 and the order running from tip to butt. The data from the ash determination in single kernels and also percentage of ash in the large sample from the same ear are given in Table 3.

1908.]

Sample & Ear.	Ash.	Protein.	Oil.	Carbohydrates.
16 (f),	{ 1.58	11.78	5.09	81.55
Tip	{ 1.59	11.76	5.10	81.55
17 (f) Middle	{ 1.58 { 1.57	$12.22 \\ 12.26$	$5.13 \\ 5.03$	81.07 81.14
18 (f)	{ 1.56	$12.36 \\ 12.42$	5.04	81.04
Butt	{ 1.58		5.03	80.97
19 (g)	{ 1.49	$11.99 \\ 11.97$	4.86	81.66
Tip	{ 1.49		4.84	81.70
20 (g) Middle	{ 1.51 { 1.51	$12.49 \\ 12.49$	$\begin{array}{c} 4.77\\ 4.76\end{array}$	81.23 81.24
21 (g)	${1.50 \\ 1.51}$	13.02	4.57	80.91
Butt		13.10	4.59	80.80
22 (h)	{ 1.37	9.72	3.90	85.01
Tip	{ 1.35	9.67	3.93	85.05
23 (h)	{ 1.37	10.07	3.98	84.58
Middle	{ 1.35	10.08	3.97	84.60
24 (h)	{ 1.51	10.49	4.01	83.99
Butt	{ 1.49	10.46	4.00	84.05
25 (i)	{ 1.47	$10.58 \\ 10.61$	4.58	83.37
Tip	{ 1.48		4,60	83.31
26 (i)	{ 1.45	11.05	4.56	82.96
Middle	{ 1.44	11.03	4.60	82.93
27 (i)	{ 1.47	11.03	4.48	83.02
Butt	{ 1.48	10.96	4.46	83.10
28 (j)	{ 1.77	$10.87 \\ 10.78$	4.36	83.00
Tip	{ 1.74		4.37	83.11
29 (j)	${1.65}$	11.35	4.56	82.44
Middle	1.62	11.31	4.58	82.49
30 (j)	$\begin{cases} 1.71 \\ 1.72 \end{cases}$	11.32	4.28	82.69
Butt		11.28	4.29	82.71

TABLE 2.—VARIATION IN COMPOSITION IN BUTT, MIDDLE AND TIP PORTIONS OF THE SAME EAR AND OF DIFFERENT EARS

The following shows the total variation:

	Ash.	Protein. Oil.		Carbohydrates.
In any single ear	.16	1 13	.30	1.06
In five ears	.42	3.43	1.23	4.25

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Kernel No.	Ear No. 1	Ear No. 2	Ear No. 3	Ear No. 4
1	1.50	1.64	1.10	1.14
$\frac{1}{2}$	1.57	1.64	1.08	1.23
3	1.61	1.63	1.09	1.13
4	1.56	1.65	1.10	1.17
5	1.67	1.59	1.07	1.13
6	1.69	1.63	1.09	1.22
7	1.71	1.68	1 07	1.25
8	1.64	1.65	1.10	1.19
9	1.64	1.70	1.21	1.11
10	1.74	1.60	1.11	1.10
Composite of ear	1.73	1.65	1.10	1.11

TABLE 3.—VARIATION IN ASH CONTENT IN KERNELS FROM THE SAME EAR AND FROM DIFFERENT EARS

These results confirm those of the previous experiments in indicating uniformity in the composition of the ear in all parts, although, of course, slight variations are found.

In the work on the protein content of single kernels, 5 ears, 3 of which were high and 2 relatively low in protein, were selected from a number of ears in a manner analogous to that described in the previous experiment. In Table 4 are shown the results of these protein determinations.

Kernel No.	Ear No. 1	Ear No. 2	Ear No. 3	Ear No. 4	Ear No. 5
1	12.46	12.17	11.53	7,45	7.72
$\hat{2}$	12.54	12.94	12.32	7.54	8.41
3	12.44	12.51	12.19	7.69	8.37
4	12.50	13.42	12.54	7.47	- 8.31
5	12.30	13.12	12.14	7.74	8.02
6	12.49	14.59	12.95	8.70	8.76
7	12.50	13.21	12.84	8.46	8.89
8	12.14	13 43		8.69	9.02
9	12.14	13.16	12.04	8.86	8.96
10	12.71	14.05	12.75	8.10	8.89
Composite of ear	13.06	13.87	12.96	7.59	8,40

TABLE 4.—VARIATION IN PROTEIN CONTENT IN KERNELS FROM THE SAME EAR AND FROM DIFFERENT EARS

Here in the protein content, as in the case of the ash, we find on the one hand comparative uniformity among different kernels of a single ear and on the other, marked variation among different individual ears.

The results of these analyses of different ears from a single variety together with analyses of different parts of single ears establish beyond question two important fundamental facts upon which all of this subsequent work of selection and breeding is founded.

The statement of these facts is as follows:

(1) The ear of corn is approximately uniform throughout in the chemical composition of its kernels.

(2) There is a wide variation in the chemical composition of different ears of the same variety of corn.

With these two principles established, we have a working basis for the chemical selection of seed corn. With uniformity in the individual ear, it is possible to determine very approximately the composition of the grain by analyzing a sample consisting of a few rows of kernels, and this is the actual practice in the examination of individual ears. If the ear represented by this sample is found to be desirable for seed, the remainder of the kernels of the ear may then be planted.

The wide variation in composition between different ears of the same variety is a very important factor in the selection of seed; as a starting point is thus furnished in each of the several lines of desired improvement.

It is to be observed that this principle of uniformity within the individual, and variation as between different individuals within the variety, holds not only for the chemical composition of the kernel but it applies as well to other characteristics such as the structure, for example, and whenever any such characteristic is related to productiveness or other utility of the crop, it should be taken into account in the breeding.

GENERAL PLAN OF THE EXPERIMENTS

In the general plan of these experiments, it was proposed to determine the influence upon the chemical composition of corn by selection and breeding in the four directions namely, (1) for increase of protein content, (2) for decrease of protein content, (3) for increase of oil content, (4) for decrease of oil content.

The method employed was as follows:

For the first selection a large number of ears were analyzed both for protein and for oil. In the high protein breeding, for example, the 24 ears highest in protein were selected for seed and planted in a plot isolated from other sorts of corn, each ear in a separate row.

These rows were harvested separately and the seed for the next planting was selected from ears of this crop which were found to be highest in protein, repeating this process each year. The breeding for low protein and for high oil and low oil was conducted on the same plan. Under this system each selection rapidly gave rise to a "pure" strain. As each original ear had its own register number and as all succeeding ears bore corresponding numbers the exact pedigree of each row (on the female side) was at all times fully known.

This general method has been maintained from the beginning, although some minor modifications of details have been made from time to time during the progress of the work as experience indicated as being desirable or as necessity demanded.

THE BREEDING PLOT

The size of the breeding plot has varied in the different plots and in the different years. The number of rows included in any plot is always given in the plot records.

The locations of these breeding plots have always been chosen with reference to their isolation from other corn fields in order to prevent cross fertilization from other kinds of corn. It is quite difficult with so many corn experiments as are carried on at this Experiment Station to obtain conditions that are ideal in this respect, but by taking advantage of tall hedge rows, and other barriers, prevailing winds, and other corn fields of the same strain, there has been but slight, if any, admixture in these breeding plots. A system of alternating the locations of the breeding plots of the opposite strains has been carried out. For example, after the first two years the locations of the high-protein and the low-protein plots were reversed; that is the high-protein plot was planted on the same ground that the low-protein plot had occupied the two preceding years and vice versa. After two years more these plots were shifted back to their original locations. The high-oil and low-oil plots were managed in the same manner. The design of this alternation of location of the plots was to provide something of a check upon the possible influence of soil upon the composition

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of the crops. The plots have been changed to other locations in later years but this system of alternating has been maintained. For each of these breeding plots there is now provided a double area which makes possible a crop rotation system including clover and other legumes, for maintaining the productivity of the land.

CULTURAL CONDITIONS

The cultural methods, including the preparation and cultivation of the soil, planting, harvesting, and handling of the crop on these breeding plots have been such as is considered good practice in ordinary corn growing. The seed has always been planted in hills in preference to drills. The present practice is to plant the hills three feet apart each way and to allow two stalks to the hill.

Attention is paid to the matter of preventing the distribution of pollen from weak, barren or otherwise undesirable plants by detasseling all such plants at the proper time.

After discovering the great advantage to be gained by the method of detasseling alternate rows and taking seed only from such detasseled rows, as pointed out in Bulletin 100, this system has been applied to all of our regular breeding plots.

The method of harvesting has been that of cutting and curing in the shock.

SAMPLING AND SELECTING

In the earlier years of the experiments a sample from each of . all of the rows was reserved by selecting a certain number of the choicest ears as judged from their physical appearance. But as the possibility of improvement became more clearly established, a system was adopted by which seed ears for the next year's planting are taken only from those rows which prove to be most productive as determined by the weight of ear corn produced, all other rows of the plot being rejected as a source of seed, and since the introduction of the system of detasseling alternate rows, only the best of the detasseled or "dam" rows have been selected. This method of selecting the choicest ears to represent the plot-row has been followed throughout the work although details of the system as regards the number of ears taken have been somewhat modified in the different years, as will appear in connection with the data which follow in the appendix.

The ears, thus chosen on account of their physical superiority, are then subjected to chemical analysis and from the results of these analyses is made the final selection of seed for the succeeding season.

[September,

In the sampling for these analyses two rows of kernels are taken lengthwise of the ear to represent the composition of the individual ear. At the same time composite samples to represent the selected plot-rows are taken by mixing together one row of kernels from each selected ear of the respective plot-rows. Each seed ear thus selected is given a permanent "Register Number" which designates that ear for all future reference.

REGISTERING

By our system of numbering the "Register Number" shows at the same time the number of the ear and the generation of the breeding. This is done by starting the first year in the 100 series numbering the ears to be planted in succession from 101, and the second generation starting with the 200 series running up from 201 and so on, starting each succeeding year of the breeding with a higher hundred. Thus Ear No. 1018 shows that this ear belongs to the tenth generation and was planted in row 18 of the breeding plot of that year. The "Dam No." is the register number of the parent ear and is useful in tracing the pedigree record from year to year. The "Annual Ear No." is simply a temporary number given to each ear to be used during examination for selection and as soon as the selection of the seed ears has been determined and the arrangement for planting has been decided the ears are given their permanent register numbers.

A description of the physical as well as the chemical characteristics of all the seed ears is kept on record including length of ear, tip circumference of ear, butt circumference of ear, number of rows of kernels, number of kernels in row, weight of ear, weight of cob, tip circumference of cob, and butt circumference of cob. Besides this numerical description a photograph record is also kept of every ear planted.

The performance record of each seed ear is shown by the weight and number of ears produced as well as the average composition of its progeny.

For a more detailed description of the system of registry used in our corn breeding work the reader is referred to Bulletin 100.

VARIETY

The variety of corn selected for this investigation was one of medium size and of safe maturity for this latitude. It has been grown upon the Experiment Station farm every year since 1887. Previous to that time it had been carefully grown for several years by Mr. F. E. Burr of Champaign county, and it was known locally as Burr's White; and this name was used in our records until 1903, when it was decided to change the name to "Illinois." The fact that these strains of corn are no longer typical Burr's White, and the fact that this corn was carefully grown for several years prior to 1896 by the Illinois Experiment Station and that since that time it has been most carefully bred by this Station for improvement in both yield and quality, so that there have been developed from this variety four different strains of corn each of which has an established pedigree now covering ten generations,—these facts have seemed to justify giving this corn a name which shall be distinctive and which shall also show its Illinois breeding; and now it is known in the records and publications of the Illinois Experiment Station as "Illinois" corn, the four different strains being designated as:

I. "Illinois High-Protein."

2. "Illinois Low-Protein."

3. "Illinois High-Oil."

4. "Illinois Low-Oil."

FIRST SELECTION OF SEED

From the 1896 crop of Burr's White corn grown upon the Experiment Station farm about two bushels (163 ears) of good sound ear corn suitable for seed were taken. From each ear a sample consisting of three rows of kernels lengthwise of the ear was taken for analysis. The results of these analyses are given in the first table of the appendix (Table 15). The data obtained show remarkable variation in the relative proportions of the different constituents. The ash varies from 1.10 to 1.74 percent, the protein from 8.25 to 13.87 percent, the oil from 3.84 to 6.02 percent and the carbohydrates from 78.92 to 85.70 percent. This is a good illustration of the variation in composition existing among individual ears of the same variety and indicates something of the possibilities for selection.

According to these variations there were taken from the 163 ears four groups,—(1) a set of twenty-four ears whose percentage of protein was comparatively high, (2) a set of twelve ears each of which contained a low percentage of protein, (3) a set of twenty-four ears high in oil content, (4) a set of twelve ears low in oil content.

These ears were taken as indicated in the last two columns of Table 15, for the seed with which to start the four respective breeding plots.

[September,

It is believed that the interest in this investigation is such as to demand the publication of a complete record of the results in detail, but this data forms such a mass of material as to make it seem advisable to place it in an appendix to this bulletin and to summarize here only the yearly averages which show very well the general results of the work. The reader who may be interested in further detail of the experiments at any point is therefore referred to the appendix (pages 489 to 575) where will be found the complete data recorded in systematic arrangement. (If not attached to this copy, the appendix will be sent upon request).

BREEDING TO INFLUENCE THE PROTEIN CONTENT

In order to obtain a general survey of these experiments to influence the protein content of corn the following table is compiled from the general averages obtained each generation from the corresponding tables given in the appendix :

Year	High-protein plot,		Low-pro	Difference	
	average percent protein.		average per	between	
	In seed	In crop	In seed	In crop	crops,
	planted.	harvested.	planted.	harvested.	percent.
1896 1897 1898 1899 1900 1901 1902 1903 1904 1905 1906	12.54 12.49 13.06 13.74 14.78 15.39 14.30 15.39 16.77 16.30	$10.92 \\ 11.10 \\ 11.05 \\ 11.46 \\ 12.32 \\ 14 \\ 12.34 \\ 13.04 \\ 15.03 \\ 14.72 \\ 14.26$	8.96 9.06 8.45 8.08 7.58 8.15 6.93 7.00 7.09 7.21	$\begin{array}{c} 10.92\\ 10.55\\ 10.55\\ 9.86\\ 9.34\\ 10.04\\ 8.22\\ 8.62\\ 9.27\\ 8.57\\ 8.64 \end{array}$	$\begin{array}{c} .00\\ ^{\circ}.55\\ .50\\ 1.60\\ 2.98\\ 4.08\\ 4.12\\ 4.42\\ 5.76\\ 6.15\\ 5.62\end{array}$

Table 5.—Ten Generations of Breeding Corn for Increase and Decrease of Protein

From this arrangement of the data we may compare the results of the different seasons and at the same time observe the relations between the two plots, thereby enabling us to follow the progress of the breeding from year to year.

Starting with the crop of 1896 with an average protein content of 10.92 percent, as represented by the original 163 ears, the average of the seed ears selected for the high-protein plot of 1897 was 12.54 percent while at the same time low-protein seed ears were selected which averaged 8.96 percent. The crop harvested from the high-protein plot in 1897 gave an average of 11.10 percent of protein while the average of the corresponding low-protein plot was 10.55 percent. Then selecting again the highest-protein ears out of this year's crop from the high-protein plot, seed for the following year was obtained which averaged 12.49 percent. Selecting the lowest protein ears from the low-protein plot, the seed for this plot in 1898 averaged 9.06 percent.

Repeating this process each year the effect has been in a general way to gradually increase or decrease the protein content in the corn according to the selection.

In glancing over the records there are a few irregularities to be seen. Comparing the results of the season of 1898 with that of the preceding year we seem to have lost a little ground in the highprotein breeding, and in the low-protein plot there was no advance made.

The next year however, following a more favorable seed selection in each case, good gains were made in both directions in 1899, and the same is true of the year 1900.

In 1901 the results are abnormal and here we have a striking illustration of the effect which may be produced by the climatic conditions of the season upon the composition of the crop. This year the protein rises abnormally high in the high-protein crop gaining 1.8 percent over that of the year before and in the lowprotein crop, instead of getting the expected decrease this year the protein content rises to over ten percent, thus reverting back to a point higher than it had been for two generations. The season of 1901 was an extremely dry one and from the lack of sufficient moisture much of the corn did not properly "fill out." In the formation of the kernel the proportion of protein is greatest in the younger stages of growth and this proportion gradually diminishes as the carbohydrates are deposited. If the conditions are such that this deposition of carbohydrates is checked, as they were this season, the corn comes to maturity with an abnormally large proportion of protein.

In the case of the high-protein plot the damaging effect of this drouth was so pronounced as to render the crop almost a total failure. The yield of ear corn amounted to only about six bushels per acre and consisted mostly of mere nubbins. On account of the scarcity of ears, it was impossible to follow the regular system of sampling, so the entire product from each plot-row was collected and all of the sound ears and even many nubbins were selected for

analysis in order to obtain the results of the year and to get any sort of seed with which to maintain the experiment. The composite samples representing the high-protein crop are therefore not obtained from the best twenty ears from each plot-row according to the regular system but they were taken from all of the corn fit to analyze from each row. Thus there were altogether only 60 individual ears from which only five were chosen for seed as being fit to plant. Fortunately it was possible to supplement these with some seed ears from our "Special High-protein" plot which was being carried on for another experiment but which was planted from the same strain as the regular high-protein plot so that these ears could be substituted without disturbing the pedigree record. The low-protein plot did not suffer so badly from the drouth, so that here the sampling and selection were made as usual.

During the season of 1902 the climatic conditions as regards rainfall were just the opposite to those of the previous year and we observe in the results obtained precisely the opposite effect. With the very wet season this year we have a great diminution of protein content in the corn in the high-protein as well as in the low-protein plot.

This seasonal condition which seems to have such a marked influence upon the composition of the corn is quite significant. The season of 1901 was very dry and it was attended by an abnormally high protein content in all the corn examined that year. The season of 1902 was unusually wet and the general tendency was to produce corn low in protein. These results are in accordance with those of other investigations, particularly in irrigation experiments where it has been observed that the quantity of water supplied has a direct influence upon the composition of corn, wheat, and oats, the protein content of the grain decreasing as the water supply increases. These results support what seems to be a general principle namely, that a lack of moisture tends to increase the proportion of protein and abundance of moisture reduces it, due, of course, to the effect of water supply upon carbohydrate formation.

With a fairly normal season in 1903 the high-protein crop made a notable advance, but the low-protein in spite of the extremely low content of the seed this year did not go down to the point attained in the low-protein season of the previous year, and in fact we have never been able since to bring it back to the extremely low point reached that year.

The season of 1904 appears to have been another one favorable to the production of protein, for the high-protein plot made a gain of two percent this year and reached its maximum figure, 15.03 percent, a point which has not since been attained. The lowprotein plot shows a similar effect, for instead of decreasing this year, it goes up to 9.27 the highest average percentage in the last five generations of the breeding.

In 1905 as might be expected the content in the high-protein crop was not so high as in the preceding high-protein season. In the low-protein plot a good gain was made this year for lowprotein.

In 1906 the percentage in the high-protein was still lower than in 1905 while in the low-protein crop, the percentage was a little higher than in the year before although the difference is not great.

The figures in the last column of the table showing the difference between the percentages of protein in the two crops produced each year are perhaps most instructive because they show the real progress attained in the breeding. They enable us to appreciate more fully the scientific value of breeding for high protein and low protein simultaneously and thereby obtaining a control upon the work which serves to eliminate the question as to the effect of seasonal tendencies in either direction.

These figures practically show a continuously increasing separation between the high-protein and the low-protein strains as the breeding advances up to 1906 so that with the exception of two slight regressions, whether the tendency of the season has been toward the production of high-protein corn or low-protein corn, the force of an hereditary influence is demonstrated always to have been in operation.

It is to be recognized of course that there are practical limits both maximum and minimum to which this matter can be carried and we should expect to finally reach a state where we would interfere with the normal physiological functions of the seed.

As to whether this last year's result in which no more gain was made in the difference between the high and low, is to be taken as indicating that we have reached these limits cannot yet be positively decided. It seems scarcely probable that with seed still unimpaired in vitality and developing into normal healthy plants furnishing otherwise normal crops that the ultimate limits should be at hand. It is proposed still to keep up the selection along these lines and the outcome of the next few years will be awaited with interest.

The results of these experiments thus far show that starting with a single variety of corn, it has been possible in ten generations

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by these methods of selection and breeding to increase the protein content from 10.92 percent in the original to 14.26 percent, thus making a gain of 3.34 percent, and at the same time by breeding in the opposite direction it has been possible to reduce the protein content from 10.92 percent to 8.64 percent, making a reduction of 2.28 percent, thus producing a total difference between the two strains of 5.62 percent. In other words the composition of this variety of corn has been so modified that two strains have been developed, one of which is now nearly twice as rich in protein as the other.

MIXED-PROTEIN PLOT

In order to eliminate the question as to whatever influence the soil might exert on the protein content of the corn an experiment was undertaken in which high-protein and low-protein seed were planted together in one plot, our so-called "Mixed-Protein Plot," where the two strains must develop under identical surrounding conditions.

The description and results of the first year of this experiment are given in Bulletin 55. The first year this mixed-protein plot contained five rows of ten hills each. In each hill were planted two kernels of high-protein corn on one side and two kernels of lowprotein on the opposite side in such manner that the resulting plants could be identified.

When the crop was harvested eight to ten ears were selected from each kind of corn from each row and from these ears composite samples were made for analysis. These analyses showed that the average protein content of the corn from the high-protein seed was invariably higher than in that produced from the lowprotein seed.

This same experiment was repeated in a somewhat larger plot in 1899 and also in 1900. (See Tables 96, 97 and 98 in the appendix for details).

The differences in protein content between the crops from highprotein and low-protein seed were 1.25 percent in 1898, 2.58 percent in 1899, and 2.86 percent in 1900.

Besides these composite samples there were analyzed from the mixed-protein plot of 1899, 137 pairs of ears in which each pair consisted of an ear produced from a high-protein kernel and one from a low-protein kernel and growing together in the same hill. The results of these analyses are given in Table 99 of the appendix and they show an average difference of 2.58 percent to be attributed positively to the influence of the seed selection. But with still further interest, it is to be noted that among these 137 different

pairs, there are only ten cases in which the higher percentage of protein is not found in the ear produced from the high-protein kernel. The most notable of these exceptions occurs in case of Row No. 2, Hill No. 11 where the low-protein kernel produced an ear 3.73 percent higher in protein than the ear resulting from the highprotein kernel. However, these abnormal individual variations are to be expected and they have frequently been observed throughout all of these experiments.

The results of these experiments with the mixed-protein plots during these three different years establish beyond question the fact that the protein content of the corn crop is influenced directly by the seed planted, independently of soil, seasonal, or cultural conditions.

BREEDING TO INFLUENCE THE OIL CONTENT

Summarizing the results of the ten generations of breeding to influence the oil content in the same manner as we have considered the protein breeding, there are brought together from the detailed records in the appendix the general yearly averages of the high-oil and low-oil plots as arranged in Table 6.

Year.	High-oil plot,		Low-o	Difference	
	average percent oil.		average p	between	
	In seed	In crop	In seed	In crop	crops,
	planted.	harvested.	planted.	harvested.	percent.
1896 1897 1898 1899 1900 1901 1902	5.39 5.20 6.15 6.30 6.77 6.95	4.70 4.73 5.15 5.64 6.12 6.09 6.41	4.03 3.65 3.47 3.33 2.93 3.00	$\begin{array}{r} 4.70 \\ 4.06 \\ 3.99 \\ 3.82 \\ 3.57 \\ 3.43 \\ 3.02 \end{array}$	$\begin{array}{r} .00\\ .67\\ 1.16\\ 1.82\\ 2.55\\ 2.66\\ 3.39\end{array}$
1903	6.73	6.50	2.622.802.672.20	2.97	3.53
1904	7.16	6.97		2.89	4.08
1905	7.88	7.29		2.58	4.71
1906	7.86	7.37		2.66	4.71

TABLE 6.—TEN GENERATIONS OF BREEDING CORN FOR INCREASE AND DECREASE OF OIL

The results show that the response to selection for oil has been even more pronounced and more regular than that for protein as indicated by the total relative increase and decrease and by the changes from year to year.

In the percentages representing the crop produced each year in the high-oil plot there has been with but one exception, namely, in

1901, a constant increase in oil content as the breeding proceeds. Likewise in the low-oil plot there has been a steady decrease from year to year with the single exception of the last year.

We have noted the marked effect which the abundance or scarcity of moisture may have upon the protein content of corn, and in these experiments the oil content appears also to be susceptible to some peculiar seasonal conditions. What these conditions are have not been determined, but that they exist is made apparent if we compare the increase and decrease in the percentage of oil in each generation in the two plots. It would appear as though certain seasons were particularly favorable to the production of oil, while other seasons may be normal or unfavorable in this respect. This effect is particularly apparent in the first two years of the breeding; thus, the season of 1897 seems to have been very unfavorable, while the season of 1898 appears to have been very favorable, to the production of oil.

From the last column in the table which shows, by the differences in percentage between the high-oil and the low-oil crops each year, the real progress accomplished by the breeding, we see that there has been a continuously increasing difference between the percentages of oil in the corn from the two plots up to the tenth year where this difference remains stationary. The high-oil corn has increased from 4.70 percent to 7.37 percent of oil, and the low-oil corn has decreased from 4.70 to 2.66 percent, the difference between the two strains having grown from nothing in 1896 to 4.71 percent in 1905. Curiously enough the oil breeding resembles the protein in the fact that there is constant progress indicated until the tenth year when in each case this progression ceases. In the protein experiments it will be recalled that the figures in this "difference column" show actually a slight regression in the tenth year while here in the oil breeding the differences between the averages of the high-oil and low-oil crop stands exactly stationary in the last two years.

As has already been remarked in the discussion of the protein breeding results, it would be rash to decide at this time from these figures that the limits to which the breeding can be carried are now determined.

Summarizing the results of the ten years' experiments to influence the oil content into one general statement we may say that starting with a single variety of corn and breeding in the two opposite directions, there has been a constantly widening separation between the two strains as the breeding advances until finally after ten generations there have been produced two kinds of corn, one of which is almost three times as rich in oil as the other.

MIXED-OIL PLOT

In order to eliminate any question of the influence of the soil upon the oil content in these experiments, a third plot was planted called the "mixed-oil plot," after the plan of the "mixed-protein plot" already described under that heading. In 1898 there were planted in this plot 50 hills arranged in five rows of ten hills each. In each hill two kernels of high-oil corn were planted on one side and two of low-oil on the opposite side and when the crop was harvested composite samples were made to represent the corn of each side of the row.

This same experiment was repeated in 1899 and also in 1900 the details being given in Tables 100, 101 and 102 of the appendix.

From the results it is to be noticed that never in any of the rows has the percentage of oil in the crop of the low-oil side approached that of the high-oil side. In 1898 the average difference in oil content in the corn resulting from the two kinds of seed was 1.11 percent, in 1899 it was 1.35 percent and in 1900 it was 1.97 percent.

From the mixed-oil plot of 1899 there were taken besides these composite samples 85 pairs of individual ears in which each pair consists of one car produced from a high-oil seed kernel and one from a low-oil kernel, both ears from plants growing in the same hill. Each of these individual ears was sampled and analyzed and these results are given in Table 103 of the appendix.

The average of all of the individual ears from high-oil seed is 5.22 percent and from low-oil seed it is 3.82 percent. But the point of most interest, perhaps, in connection with this table is the regularity with which the oil content of the crop responds to that of the seed planted, for among the 85 pairs there are only four cases in which the oil in the ear, resulting from low-oil seed happens to surpass in percentage that from the high-oil seed.

The results of these three years' experiments with the mixed-oil plot are all in accordance and they establish beyond dispute the possibility of influencing the oil content of corn by the selection of the seed, showing conclusively that heredity has been responsible for the results obtained quite independent of soil, climatic or cultural conditions.

SECONDARY, EFFECTS PRODUCED BY SELECTION TO CHANGE THE COMPOSITION OF THE GRAIN

As is always the case in investigations of this sort, the work had not proceeded far before a multitude of interesting side questions arose, inviting investigation in all directions from the main issue. What secondary effects are produced by this intense selection for these special chemical characteristics? What, for example, is the effect of changing the proportion of protein in the grain upon the other constituents? How is the composition of other parts of the plant affected? What influence has it upon the physical type of the kernel and of the ear? And, what is of especially practical importance, how is the yield affected?

Having established the possibility of influencing the composition of the kernel in this way by several years of breeding and after having actually produced the different kinds of corn to work with, it became possible to take up the study of some of these important secondary effects. The results of the investigation of some of these questions are given in the following pages.

EFFECT ON THE COMPOSITION OF OTHER PARTS OF THE PLANT

After the breeding plots had been under way for five years and marked changes had been produced, a study was begun to ascertain how the composition of other parts of the plant was being affected by altering that of the grain.

Beginning in 1903, there have been collected every year at harvest time representative plants from each of the four "Illinois" breeding plots. These plants were divided in the following manner into three parts, namely, upper-stalk, lower-stalk, and leaves. The leaves were first stripped off from the stalks and these, including the husks, constituted the sample designated here as "leaves." Then at the joint where the ear was borne, the stalk was divided and the part below this point comprised the sample called "lowerstalk," and all above including the tassel, made up the sample designated as "upper-stalk."

It may be observed that the condition of these samples is just as it would be in the ordinary handling of corn stover on the farm. It was cured in the field in the ordinary manner, the stalks having lost some parts of the leaves and tassels. Then this rather arbitrary division into parts follows somewhat in the natural way in which the stover is eaten by animals as fed entire without cutting or shredding. The leaves and husks are entirely consumed and usually a portion at least of the upper stalk is eaten. If any is refused, it is the coarser part of the stalk corresponding somewhat to 1908.]

our sample of "lower-stalk." With this practical bearing in mind, there is lent something of an added interest to the analyses.

The results of the analyses of these samples are brought together in the tables that follow. For convenient comparison each constituent is considered by itself in a table showing the percentages found in the several parts of the plant in the different strains each season.

In the first two years of the work these samples were taken from every individual breeding row in the four plots so that the results shown here really represent averages of several hundred analyses, but these data form such a mass of material that lack of space forbids presenting them here in detail.

EFFECT ON THE ASH CONTENT

We will consider first the effect produced by the breeding upon the ash content as shown in the following table:

Year.	Strain.	Upper-stalk.	Lower-stalk	Leaves.	Grain.
1902	High-Protein	5.25	4.08	8.21	1.57
	Low-Protein	5.82	5.09	8.64	1.45
1902	High-Oil	5.65	4.89	7.59	1.54
	Low-Oil	4.91	3.72	7.11	1.42
1903	High-Protein	5.23	4.52	9.66	1.52
	Low-Protein	4.86	4.28	7.98	1.34
1903	High-Oil	5.20	3.98	8.23	1.47
	Low-Oil	4.75	4.27	7.27	1.47
1904	High-Protein Low-Protein	4.38 5.14	3.95 4.57	$\begin{array}{c} 6.56 \\ 7.51 \end{array}$	1.60 1.41
1904	High-Oil	5.05	5.80	7.66	1.56
	Low-Oil	5.59	5.53	8.12	1.43
1005	High-Protein Low-Protein	4.30 5.00	4.02 4.61	6.52 7.47	$1.54 \\ 1.50$
1905	High-Oil	5.26	5. 92	8.06	1.58
	Low-Oil	5.69	5.47	8.34	1.28
1906	High-Protein Low-Protein	4.77 4.28	4.93 4.15	9.08 8.85	1.48 1.41
	High-Oil Low-Oil	5.05 5.67	5.61 4.84	7.72 7.01	$1.64 \\ 1.46$

TABLE 7 .--- ASH CONTENT IN DIFFERENT PARTS OF PLANT

Comparing the percentages of ash in the high-protein and lowprotein strains in the upper-stalk, there is no regularity apparent. In two of the seasons the percentage was greater in the highprotein plot and in the three other seasons it was smaller. The lower-stalk varies in the different seasons in accordance with the

upper-stalk, and the same is true of the leaves. In the grain the differences are very slight but they show every season a little more ash in the high-protein corn.

Comparing the samples of the various parts from the high-oil and low-oil strains, we find no regularly concordant variations except in the case of the grain where usually the percentage of ash has been a trifle higher in the high-oil than in the low-oil corn. In regard to the distribution of the ash over the plant as a whole we find, as we should expect in accordance with what is generally observed in plant studies of this nature, the lowest proportion of ash in the seed and the highest in the leaves where it amounts sometimes to almost one-tenth of the dry substance.

EFFECT ON THE PROTEIN CONTENT

It is especially interesting to note how the change in the proportion of protein in the grain has affected this constituent in other parts of the plant. For example, does the increase of protein in the kernel mean an increase of this substance in the other organs of the plant, or is this higher content in the kernel the result of an accumulation produced at the expense of other parts?

Table 8 shows the results of the protein determinations in the various parts of the plant.

Year.	Strain.	Upper-stalk.	Lower-stalk	Leaves.	Grain.
1902	High-Protein Low Protein	3.31 2.90	3.28 3.21	5.00 4.99	$12.34 \\ 8.22$
1902	High-Oil Low-Oil	3.70 2.78	4.72 2 83	5.13 4.86	$\begin{array}{c} 10.83\\9.31\end{array}$
19 3	High-Protein Low-Protein	4.00 3.80	3.20 4.26	4.92 5 28	13.04 8.62
Hi	High-Oil Low-Oil	3.20 3.50	3.28 3.58	5.04 5.04	$\begin{array}{c} 11.04\\ 10.22 \end{array}$
1904	High-Protein Low-Protein	6.52 3.06	5.68 3.46	5.34 4.77	15.03 9.27
1504	High-Oil Low-Oil	4.53 4.00	4.08 4.94	4.86 5.10 •	$12.29 \\ 10.88$
1905	High-Protein Low-Protein	6.13 3.59	6.03 4.59	6.46 5.81	$ \begin{array}{r} 14.72 \\ 8.57 \end{array} $
1905	High-Oil Low-Oil	4.38 4.41	6.32 4.09	6.42 5.74	12.12 9.86
1005	High-Protein Low-Protein	5.99 5.61	4.94 6.48	5.27 7.13	14 26 8.64
1906	High-Oil Low-Oil	5.38 4.37	6.56 4.37	5.57 5.03	$11.81 \\ 10.54$

TABLE 8.—PROTEIN CONTENT IN DIFFERENT PARTS OF PLANT (Protein derived by multiplying the nitrogen content by the factor 6.25)

1908.]

Upon comparing the protein content of the upper-stalk samples we find that the percentage has always been greater in the highprotein plot varying in the different seasons, from only a slight difference to over double the amount.

The lower-stalk follows the upper-stalk in this respect in three of the seasons but in the other two years the protein runs higher in the low-protein strain. The leaves agree quite closely in every case with the lower-stalk.

The wide differences in the protein content of the grain are, of course, the direct result of the selection which have already been considered so that we need not discuss them further in this connection.

Turning now to the oil breeding, there seems to be a lack of any significant regularity in the parts of the stover. In the upperstalk the percentage of protein runs higher three out of the five seasons in the high-oil strain. In the lower-stalk it is three times out of the five higher in the high-oil strain but corresponding only three times with the upper-stalk. The leaves correspond with the lower-stalk in this comparison.

But a very marked correlation appears in the grain where there has been every year a notable increase in protein in the high-oil strain over that of the low-oil. This is indeed significant and is of such interest that it will be discussed more fully later on.

Regarding the general distribution of the protein in the plant, the data show; that in the other parts, the proportion of protein is never as high as it is in the grain; that among the other parts, the leaves have averaged somewhat higher than the stalks although this condition has not been constant in every year; that, as between the upper and lower portions of the stalk no regular difference can be established.

EFFECT ON THE CRUDE FAT CONTENT. (Ether Extract.)

It will be noticed that the term "crude fat" is used here for designating this determination rather than "oil" as has been used in the rest of this work in which only the kernels were concerned. It should be considered that while in the kernels the substance extracted by ether is practically all oil, in the stalk and leaves it consists to a considerable extent of other constituents besides true fats, or oil, such as coloring matters, waxes, organic acids, etc. On this account these results of the ether extraction are not to be taken as necessarily explicitly expressing the relations of the amount of oil or fat in the various organs of the plant to that of the kernels. However in the chemical analyses of food stuffs, the ether extraction is the best practical method that we have at present of classify-

ing these substances, and in view of the fact that it is usually made and reported in fodder analyses this determination was made in this study with the idea that the information would be of interest and might prove suggestive. The results are given in Table 9.

Year.	Strain.	Upper-stalk.	Lower-stalk	Leaves.	Grain
	High-Protein Low-Protein	0.98 0.82	1.31 0.95	$1.02 \\ 1.02$	4.85
1902	High-Oil	1.08	1.27	0.99	6.41
	Low-Oil	0.87	1.21	1.02	3.02
	High-Protein Low-Protein	. 0.92 0.77	1.42 0.88	1.04 0.90	4.83 4.08
1903	High-Oil Low-Oil	0.69 1.18	0.86 0.98	0.98 0.98	$6.50 \\ 2.97$
	High-Protein	0.77 0.78	1.23 0.81	1.16 1.00	5 07 4.17
1904	High-Oil Low-Oil	0.67 0.69	0.87 0.90	$\begin{array}{c} 1.10 \\ 0.98 \end{array}$	$6.97 \\ 2.89$
	High-Protein Low-Protein	0.95 0.88	1.20 0.95	1.21 1.28	5.04 3.85
1905	High-Oil Low-Oil	$\begin{array}{c} 0.82\\ 0.72\end{array}$	$1.00 \\ 0.82$	$\begin{array}{c} 1.24 \\ 1.09 \end{array}$	7.29° 2.58
1906	High-Protein Low-Protein	1.02 1.62	1.69 1.89	1.25 1.46	5.28 3.86
	High-Oil Low-Oil	$1.07 \\ 1.29$	2.05 1.46	1.32 1.23	7.37 2.66

TABLE 9.--ETHER EXTRACT IN DIFFERENT PARTS OF PLANT

The proportion of ether-extract in the stalks and leaves is not very large ranging mostly around one percent and there are no apparent relations among these results that would indicate any significant influence of the selections either in the protein or in the oil breeding.

In the case of the grain, however, there is an interesting correlation manifested. We have already seen how the protein content of the grain is influenced by the oil selection, and, just as the protein rises and falls with the oil content, so here the oil follows the protein selections, and in every season there is a decided increase of oil in the high-protein strain over that of the low-protein.

The figures show in regard to the relative proportions of etherextract in the different parts of the plant, that the crude fat in other parts scarcely ever approaches in percentage the oil in the kernel and also that it is generally greater in the lower-stalk and leaves than in the upper-stalk.

EFFECT ON THE PHOSPHORUS CONTENT

On account of their especial bearing upon questions pertaining to soil fertility a knowledge of the phosphorus and potassium contents in these different strains of corn is of interest. Accordingly determinations of these two elements in the samples of the different parts of the plants have been made since 1903. The percentages are given in Tables 10 and 11 being expressed in terms of the elementary substances.

Year.	Strain.	Upper-stalk.	Lower-stalk	Leaves.	Grain.
	High-Protein Low-Protein	0.19 0.12	0.19 0.10	0.15 0 14	0.36 0.30
1903	High-Oil Low-Oil	$\begin{array}{c} 0.10\\ 0.10\end{array}$	0 08 0.09	0.10 0.13	$0.34 \\ 0.31$
1904	High-Protein Low-Protein	0.26 0.14	0.24 0.10	0.18 0.12	0.38 0.33
1904	High-Oil Low-Oil	0.21 0.17	0.12 0.17	0.16 0.18	$\begin{array}{c} 0.38\\ 0.35\end{array}$
1005	High-Protein Low-Protein	0.26 0.12	0.22 0 09	0.18 0.12	$\begin{array}{c} 0.32\\ 0.30\end{array}$
1905	High-Oil Low-Oil	0.18 0 17	$\begin{array}{c} 0.11\\ 0.14\end{array}$	$\begin{array}{c} 0.12\\ 0.17\end{array}$	0.34 0.25
1906	High-Protein Low-Protein	0 28 0.29	0.32 0.21	0.21 0.24	0.34 0.30
1900	High-Oil Low-Oil	0.25 0.19	0.22 0.14	0.19 0.15	0.35 0.31

TABLE 10.—PHOSPHORUS CONTENT IN DIFFERENT PARTS OF PLANT

Comparing the high-protein and low-protein strains it is interesting to note that with only the exception of the upper-stalk and leaves in 1906, the phosphorus content is always somewhat higher in the samples representing the high-protein plot both in stover and grain.

In the breeding for high and low-oil, however, such a correlation does not appear in the stover but in the grain we find regularly a higher phosphorus content in the high-oil corn. Taking the plant as a whole the grain is decidedly the richest part in phosphorus thus conforming to what has been generally observed.

EFFECT ON THE POTASSIUM CONTENT

Comparing the high-protein and low-protein plots the different parts of the stover show agreement in three out of the four years in being somewhat richer in potassium in the low-protein strain. The other season all parts were richer in this element, in the highprotein strain.

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Year.	Strain.	Upper-stalk.	Lower-stalk	Leaves.	Grain.
1903	High-Protein Low-Protein	1.47 1.52	1.64 1.64	0.90 0.97	$0.35 \\ 0.32$
	High-Oil Low-Oil	1.34 1.33	1.10	0.76 1.25	$\begin{array}{c} 0.36\\ 0.36\end{array}$
1904	High-Protein Low-Protein	$\begin{array}{c} 1.07 \\ 1.67 \end{array}$	$\begin{array}{c} 1.10 \\ 1.67 \end{array}$	1.02 1 31	0.37 0.35
	High-Oil Low-Oil	1.63 1.55	1.70 = 1.74	1.48 1.56	0.39 0.39
1905	High-Protein Low-Protein	1.03 1.61	$\begin{array}{r}1.07\\1.62\end{array}$	1.05 1.35	0.34 0.37
	High-Oil Low-Oil	1.65 1.81	$\begin{array}{c} 2.36\\ 2.08\end{array}$	$\begin{array}{c} 1.39 \\ 1.60 \end{array}$	0.36 0.37
1906	High-Protein Low-Protein	1.17 0.89	1.54 1.17	0.88 0.82	0.36 0.40
	High Oil Low-Oil	$1.59 \\ 1.59$	2.14 · 1.79	1.22 0.92	$\begin{array}{c} 0.39 \\ 0.40 \end{array}$

TABLE II.—POTASSIUM CONTENT IN DIFFERENT PARTS OF PLANT

In the grain samples the comparisons show conflicting results but the differences here are so small as to be scarcely significant.

As between the high-oil and low-oil breeding no regularity among the stover samples can be made out. In the grain the percentages are just a trifle greater in the low-oil corn but the differences are too slight to be considered seriously.

These results likewise accord with the usual observance that the stover carries a much larger proportion of potassium than the grain. The stalks and leaves do not vary greatly in this respect.

CONCLUSIONS

The preceding data afford material for numerous other comparisons and a critical study would doubtless reveal many other suggestive facts, but it is our present purpose only to derive as direct an answer as possible to our main question regarding the effect produced upon the composition of the plant as a whole by altering the relative proportions of the constituents of the kernel.

Summarizing the results of this study and putting them into the form of a general statement we may say, that aside from the correlation developed between protein and oil in the grain, there has not been produced any very marked effect. The ash in the grain appears to be influenced very slightly by the protein as well as the oil selection, following these selections in direct correlation. The same is true of the phosphorus content. Further there' is seemingly a tendency toward an increased phosphorus content in the stover resulting from high-protein selection, but this observation needs further confirmation.

CORRELATION BETWEEN PROTEIN AND OIL IN THE KERNEL

At the beginning of the breeding the correlation between the protein and oil content in the kernel was only very slight. The result of the mathematical calculation of this correlation in the original 163 ears from which the first selections were made, as given in Bulletin 87, shows only 3.81 percent of a perfect correlation.

But, although this correlation is insignificant at first, it seems to have advanced with the breeding so that, as we have just observed, after five years it became very prominent both in the protein and in the oil selections.

It is interesting to trace the development of this correlation in the progress of the breeding as may be done in Table 12 in which are given the percentages of oil in the high-protein and low-protein strains each generation excepting the second and third years when these determinations were not made.

Average percent oil.						
Year.	High-protein crop.	Low-protein crop.	Difference.			
1897	4.52	4.35	0.17			
1898						
1899						
1900	4.75	4.31	0.44			
1901	4.82	4.30	0.52			
1902	4.85	4.15	0.70			
1903	4.83	4.08	0.75			
1904	5.07	4.17	0.90			
1905	5.04	3.85	1.19			
1906	5.28	3,86	1.42			

TABLE 12 .-- OIL CONTENT IN HIGH-PROTEIN AND LOW-PROTEIN STRAINS

The last column which shows the difference in oil content each year brings out the principle in a most interesting way. This difference between the two plots begins with a very small figure which gradually increases as the breeding goes on corresponding to the differences in the protein itself, until in the tenth generation this difference becomes so significant as to amount to about one-third of the total quantity of oil.

In like manner the behavior of the protein in the high and lowoil strains is shown in Table 13.

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crop.	Low-oil crop.	Difference.
76 33 32 33 34 29 22	$ \begin{array}{c} 11.03 \\ \dots \\ 11.00 \\ 10.03 \\ 9.31 \\ 10.22 \\ 10.88 \\ 9.86 \\ \end{array} $	$ \begin{array}{c} -0.27 \\ \cdots \\ -0.17 \\ 2.29 \\ 1.52 \\ 0.82 \\ 1.41 \\ 2.26 \\ 1.27 \\ \end{array} $
	2 33 99	2 10.03 33 9.31 44 10.22 99 10.88 2 9.86

TABLE 13 .- PROTEIN CONTENT IN HIGH-OIL AND LOW-OIL STRAINS

Although the differences in protein content in the high-oil and low-oil plots have not been as regular or constant as in the case of the oil content in the high-protein and low-protein plots, yet the same principle is evident, for, whereas in the earlier years the protein actually averages a little higher in the low-oil strain as indicated in the table by the minus signs, in later generations after the breeding had advanced and greater differences in the oil content had been induced, the correlation appears and remains, although fluctuating in intensity from year to year.

EFFECT ON THE TYPE OF KERNEL

That the selection for certain chemical constituents has a very noticeable effect upon the physical charactertistics of the kernel was observed very early in the work and in Bulletin 55 descriptions with photographs were published showing the possibility of distinguishing between high-protein and low-protein corn as well as between high-oil and low-oil corn by the mechanical structure of the kernel. The matter has been mentioned again in Bulletins 82 and 100, and Bulletin 87, "The Structure of the Corn Kernel and the Composition of its Different Parts," deals especially with this phase of the subject, treating it in considerable detail. Therefore it is not proposed to discuss this matter at length here, but only to call attention briefly to the facts observed in this connection.

Selection for high-protein has developed a type of kernel having a relatively larger proportion of that part characterized by its horny structure, the soft starchy part which immediately surrounds the germ and runs up into the crown of the kernel being less prominent. In the type of kernel resulting from low-protein selection

this condition is reversed and here the soft starchy part predominates. Viewed externally the high-protein kernel has a somewhat glassy appearance while the low-protein presents a milky effect.

Following the fact that about four-fifths of all the oil in the kernel resides within the germ, the selection for high-oil has resulted in a kernel having a relatively large proportion of germ, while the low-oil selection has produced a kernel whose germ occupies a relatively small proportion of the space.

It should be borne in mind that a reduction of the proportion of germ does not necessarily depend altogether upon a decrease in the absolute size, for the same effect would be produced by increasing the size of the endosperm, and in our low-oil strain this is what has really taken place to some extent, so that the selection has resulted in a large broad type of kernel admitting fewer rows on the cob.

The question is often asked as to whether there is any difference apparent in germination on account of this effect upon the size of the germ. In laboratory tests under carefully controlled and comparable conditions a difference in the rate and vigor with which the germination starts off has been observed, the first signs of growth appearing about twenty-four hours earlier in the highoil corn. This difference, however, becomes less apparent as the development of the young plantlet proceeds and in the field there is as yet no detrimental effect noticeable due to impaired vitality in the seed brought about by the selection for low-oil.

EFFECT ON THE TYPE OF EAR

That the selection in these different directions has likewise had its effect upon the physical characteristics of the ear is clearly shown in Bulletin 119, "Type and Variability in Corn," in which Dean Davenport and Doctor Rietz have made this matter the subject of a special study.

In this investigation ears from each of the four "Illinois" strains from the crops of the ninth and tenth generations were subjected to measurements of their length, circumference, weight, and number of rows of kernels.

The variability of each one of these charactertistics was studied by the statistical method in which are determined mathematical expressions showing the "mean," or average value of the character in question, as well as its tendency to vary from this average, expressed by the "standard deviation" and the "coefficient of variability." Taking from these tabulated results those figures which are of especial concern in this connection, the following interesting facts are brought out.

Selection for high-protein has produced an ear averaging somewhat smaller than the low-protein ear as shown by a comparison of the length, circumference and weight; the number of rows of kernels also averages slightly less on the typical high-protein ear.

Similarly the high-oil selection has resulted in a smaller type of ear than has the low-oil, the length, circumference and weight being less in each case in the high-oil strain. However, in spite of the fact that the typical low-oil ear is the largest of any of the strains, the number of rows of kernels is the least, this being due to the broadening of the kernel as previously explained.

EFFECT ON THE YIELD

One of the first questions to be taken into consideration from the practical standpoint is, of course, the effect that selection for these various characteristics has upon the productiveness.

In this connection it should be borne in mind that during the earlier years of these experiments in the selection of seed no special precaution was taken against in-breeding. If the pedigree lines be traced back in the high-protein plot it will be found that they all converge in a single ear grown in 1901. The low-protein strain as it now exists is the progeny of two of the original ears and the same is true of the low-oil. The high-oil strain traces back to three original ears. Thus the pedigree records show that there must have been a considerable amount of rather close in-breeding which has probably exerted a more or less detrimental effect upon the yield. It was not until the ninth generation that we started our present system of taking seed from detasseled rows only and arranging the planting of the seed ears with reference to their relationship, in order to prevent as far as possible such close in-breeding.

Neither was there in the earlier years of the breeding any selection based upon productiveness other than the choice of the largest, finest seed ears. In the sixth generation a system of rejecting a few of the lowest yielding rows was begun but it was not until the ninth generation that our present system was adopted of selecting one-half of the detasseled rows according to their performance as regards productiveness.

Therefore in speaking of the yielding propensities of these several strains of corn, these handicaps which they have undergone in the breeding should be taken into consideration.

In order to test this matter of yield, seed has been taken every year since the sixth generation from each of the four breeding plots and planted in our variety test plots where they are given conditions of soil and culture as uniform as possible for securing comparable results. In this variety test there are planted at certain intervals socalled "Standard plots" from one of the best standard varieties of this region the purpose of these being to serve as a check for comparison in different parts of the field. In Table 14 the yield each year in terms of bushels of shelled corn per acre is given for each of the four "Illinois" strains along with that of the standard variety.

Year.	High- protein strain.	Low- protein strain.	High- oil strain.	Low- oil strain.	Standard variety.
1903 1904 1905 1906	27.3 32.1 56.6 65.1	37,7 55.5 60 7 73.2	32.7 41.9 58.4 66.3	41.3 40.5 58.1 83.2	40.9 (Boone Co. White) 53.7 ("""") 68.4 (Silvermine) {75.7 (") 87.9 (Leaming)

TABLE 14 .---- YIELDS OF "ILLINOIS" STRAINS IN VARIETY TEST PLOTS

In looking over these results there are some irregularities to be seen and it is still too early to draw final conclusions in all respects. The maximum yield varies among the four strains in the different years. In two of the seasons the low-oil gave the highest yield and in two others the low-protein yielded most.

But the lowest yield has in every season been produced by the high-protein corn and this fact accords with our previous observation regarding the type of ear where we found the typical highprotein ear to be the smallest of all the four strains. So it seems a high-protein content and the highest productivity do not go together.

The formation of protein depends, of course, upon the supply of nitrogen in the soil. In fact the relation is so intimate that it has been observed in experiments that the protein content can be increased in corn by the application of nitrogenous fertilizers. This suggests the possibility of a limitation of growth on ordinary soil due to an extra high nitrogen requirement on the part of the high-protein strain.

If, however, we consider the production of *protein per acre* we will find a very decided gain in the production of protein in the high-protein breeding. For example in 1906 the high-protein strain produced 65.1 bushels per acre and the protein content of the crop that year as we have seen was 14.26 percent. This would yield (reckoning 56 pounds shelled corn per bushel) 520 pounds of

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protein per acre. At the same time the low-protein strain produced 73.2 bushels carrying 8.54 percent of protein which would yield 354 pounds. This makes a difference of 166 pounds of protein per acre in favor of the high-protein breeding. This, however, from the practical standpoint, would be an unfair comparison because ordinarily what the farmer has to deal with is corn of ordinary protein content rather than low-protein corn. We have no "Illinois" strain now unaffected by chemical selection with which to make the comparison. But suppose we compare our "Illinois High-Protein" with the standard white variety for this year, that is the "Silvermine," which has had no chemical selection, and assume that it contains the same percentage with which we started the "Illinois" breeding, that is 10.92, which as a matter of fact is not far from the average of ordinary dent corn. Making the computation we find that the 75.7 bushel yield containing 10.92 percent would give us 463 pounds of protein per acre. Based upon this estimate there was a gain this year of 57 pounds of protein per acre by the high-protein breeding and this is of no mean consequence when we consider that this 57 pounds represents about oneeighth of the total quantity of protein produced.

On the whole these results of the yields are quite gratifying when we consider that these "Illinois" strains have maintained their productiveness as well as they have in spite of the intense selection they have undergone for other special characteristics. With the exception of one season, some one of the Illinois strains has even surpassed in yield the supposedly good variety used as a standard. All of this goes to show that intense selection for a special character is not necessarily accompanied by a reduction in yield, this not implying, of course, that selection for yield alone would not make greater progress when unhampered by consideration for other characteristics.

APPENDIX

In connection with this investigation a large amount of experimental data has been collected. For the selection of seed for these four "Illinois" breeding plots there have been analyzed during the ten years 4990 individal ears. Of these, 756 ears have been selected and subjected to performance test in the breeding plots and the records of these tests form a most interesting and instructive series. The importance of placing these data on record by publication rests not alone upon their direct connection with the subject matter in hand. There are many obscure problems in this work of corn breeding of intensely practical significance upon which we may hope to secure light by a study of such heredity records as these, and in the study of the broader problems relating to the general subject of heredity there has been a lack of just such specific statistical data as these analyses afford. Already they have furnished excellent material for some such studies and naturally their value as such will ever increase with their accumulation. Therefore it seems advisable to present the essential detailed data of these experiments, preferably incorporated in systematic arrangement in an appendix where they may be referred to at pleasure, rather than encumbering the text of the bulletin with such a mass of statistical material.

The following tables are so arranged in series that the complete history of each strain of the breeding is shown by itself. For each year there is given a record of the breeding plot in a table showing the analyses of the seed ears planted and of the corresponding crops harvested. Immediately following this table is a second one in which are listed the analyses of all of the ears examined from that breeding plot for the selection of seed ears to be planted in the succeeding year's plot.

By this arrangement it is made possible with the system of "Register Numbers" and "Dam Numbers" previously explained, to readily find the relationships of all the ears ever produced in each of the four strains.

The first table gives the complete analyses of the 163 original ears from which the four strains of corn were started and a column is added to indicate to which of the breeding plots each of the selected ears is assigned. Following this table are given the series of records for the high-protein plot, low-protein plot, high-oil plot and low-oil plot in the order named.

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The "Annual Ear No." in these records correspond to the "Corn No." as used in Bulletin 55 and, as previously explained, this is simply a temporary number used while working with the corn for the selection and has no permanent significance, there is no necessity for changing the back records in this respect and so these old numbers are retained. They begin in the first table with - No. 76 and run in the order of the rows of the breeding plot, that is in the order of their mother ears or "Dam Numbers."

In the first year usually four ears were analyzed from each plotrow and every fifth number was given to the composite sample representing the row as will be seen in the tables of 1897. In the years following, up to 1903, nine ears were analyzed from each plot-row and every tenth number was given to the corresponding composite sample. In 1903 the new system was adopted in which the "Annual Ear Number" begins with I each year and ten ears are anaylzed from each selected plot-row with no provision for composite sample numbers, within the series. In 1905 another modification was introduced in which 20 ears instead of 10 are analyzed from each selected plot-row.

In the tables of analyses all ears that have been selected for seed are indicated by their assigned "Register Nos." being placed in the column opposite.

In order to illustrate the working of this system of records let us suppose that it be desired to trace the pedigree record of a given ear. We may take as an example the first ear analyzed from the high-protein plot in 1906 and registered as No. 1102. We see immediately that the "dam" or mother of this ear was No. 1004. By reference to the plot record of the year 1906 we find that the ear with Register No. 1004 had a protein content of 17.39 percent and that its "dam" was No. 914. Turning now to the plot record of the previous year we find that Register No. 914 had 17.73 percent of protein and by the corresponding "Dam No." we are referred to No. 811 of the preceding generation. Following along in this manner through the preceding generations we finally trace the complete maternal pedigree back to the beginning of the breeding. Thus we find the pedigree record with respect to the protein content of this ear registered as No. 1102 to run as follows: 1908.]

TEN GENERATIONS OF CORN BREEDING.

Maternal pedigree record.	Year planted.	Protein, percent.
Register No. 1102. By Dam No. 1004. """"""""""""""""""""""""""""""""""""	1907 -1906 1905 1904 1903 1902 1901 1900 1899 1898 1897	$17.13 \\ 17.39 \\ 17.73 \\ 17.33 \\ 14.70 \\ 15.00 \\ 15.71 \\ 14.53 \\ 12.45 \\ 12.46 \\ 12.28 $

At the end of these four series of the regular plots are Tables 96 to 103 inclusive which contain the records of the mixed-protein and mixed-oil plots.

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Annual ear No.	Ash.	Protein.	Oil.	Carbohy- drates.	Plot assigned.	Register No. assigned.
76 77 78 79 80 81	$ \begin{array}{r} 1.70 \\ 1.45 \\ 1.55 \\ 1.62 \\ 1.63 \\ 1.47 \\ \end{array} $	$ \begin{array}{r} 10.05 \\ -10.42 \\ 11.00 \\ 10.89 \\ 11.50 \\ 11.49 \end{array} $	$\begin{array}{r} 4.77 \\ 5.24 \\ 4.90 \\ 4.88 \\ 4.58 \\ 4.26 \end{array}$	83.48 82.89 82.55 82.61 82 29 82.78	High-oil	107
82	1.39	11.78	4.83	82.00	_	102
83 84	1.17 1.51	$9.08 \\ 12.79$	4.05 4.25	85.70 81.45	Low-protein	103 110
85	1.46	12.79	4.25	81.84	High-protein	
86	1.50	12.07	4.61	81.82	High-protein	102
87	1.59	12.40	4.7±	81.27	High-protein	117
88	1.35	9.34	4.84	84.47		
89 90	1.61 1.55	$\begin{array}{r} 10.71 \\ 9.90 \end{array}$	$4.70 \\ 4.97$	82.98 83.58		
91	1.55	10.68	4.91	82.85		
92	1.46	12.96	3.97	81.61	High-protein	113
93	1.48	11.80	4.80	81.92		1.01
94	1.74 1.55	11.89	4.55	81.82 82.45	High-protein	101 109
95 96	1.60	10.49 11.10	5.51 4.38	82.92	High-oil	105
97	1.59	11.84	4.96	81.61		
98	.1.39	10.23	5.51	82.87	High-oil	115
99	1.42	8.40	4.91 4.76	85.27	Low-protein	107 105
100 101	1.05	$\begin{array}{c} 12.28\\ 10 \ 08 \end{array}$	4.70	81.31 83.76	High-protein	105
102	1 49	11.83	4.51	82.17		
103	1.44	11.25	4.78	82.53		
104	1.54	11.82	4.43	82.21	TT:	119
105 106	1.37 1.33	$12.36 \\ 11.15$	4.84 5.21	81.43 82.31	High-protein High-oil	120
107	1.33	9.47	4.97	84.23	ingi on	
108	1.30	11.04	4.67	82 99		
109	1.45	10.82	5.65	82.08	High-oil	111 111
110 111	1.60 1.31	$\begin{array}{r} 12.81 \\ 10.76 \end{array}$	5.21 4.13	80.38 83.80	High-protein	111
112	1.26	10.48	4.54	83.72		
113	1.10	9.30	4.38	85.22	Low-protein	111
114	1.33	9.12	4.10	85.45	Low-protein	102
115 116	1.29 1.10	10.41 8.38	4.17 4.88	84.13 85.64	Low-protein	105
117	1.42	9.95	4.23	84.40	Low-protein	100
118	1.44	11.40	5.02	82.14	High-oil	101
119	1.55	12.38	4.62	81.45	High-protein	106
120 121	1.39 1.36	9.97 10.09	4.42 4.82	84.22 83.73		
121	1.30	10.09	5.25	83.08	H1gh-oil	117
123	1.34	9 68	4.01	84.97	Low-oil	108
124	1.44	11.87	4.61	82.08		
125 126	1.34 1.49	$10.73 \\ 13.87$	4.53 5.72	83.40 78.92	High-protein	112
120	1.49	13.87	4.31	82.73	ingn-protein	
128	1.33	11.64	4.57	82.46		
129	1.36	11.25	4.16	83.23	l.	

 TABLE 15.—Composition of One Hundred Sixty-three Individual Ears from General Crop of 1896

1908.]

	<u> </u>					
Annual ear No.	Ash.	Protein.	Oil.	Carbohy- drates.	Plot assigned.	Register No. assigned.
	1 25	11.00	5.01	01 50		
130	1.35 1.47	11.86	5.01 4.86	81.78		
131	1.55	10.49 11.13	4.80	83 18		
132	1.35	11.13	4.33	82.77	T	110
133	1.39	10.85	4.45	83 38 83.40	Low-oil	110
134 135	1.37	11.29	4.53	82.81		
135	1.59	11.43	5.10	81.88	High oil	107
130	1 47	11.61	4 41	82.51	High-oil	103
138	1.36	11.36	4.53	82.75		
139	1.57	9.81	5.23	83.39	High-oil	118
140	1.34	10 53	4.18	83.95	Ing n-on	110
140	1 45	12.42	4.51	81.62	High-protein	120
142	1.37	9.31	4.82	84.50	ingn-protein	120
143	1.29	11.33	4.49	82.89		
144	1.42	11.39	4.99	82.20	High-oil	124
145	1.45	8.25	4.81	85.49	Low-protein	106
146	1.47	11.29	4.83	82.41	How protoin	100
147	1.26	12.21	4.49	82.04	High-protein	123
148	1 54	11.94	4.74	81.78		100
149	1.36	11.29	4.08	83.27	Low-oil	101
150	1.44	11.71	4.03	82.82	Low-oil	103
151	1.40	9.31	4.96	84.33	Low-protein	101
152	1.41 •	11.90	4.09	82 60	Low-oil	102
153	1.35	12.51	5.19	80.95	High-protein	108
154	1.42	11 13	5.02	82.43	High-oil	123
155	1.44	11.05	4.53	82.98	0	
156	1.39	11.74	4.14	82.73	Low-oil	112
157	1.46	10.02	4.88	83.64		0
158	1 45	10.66	4.51	83.38		
159	1.48	11.53	4.65	82.34		
160	1.43	11.50	4.83	82.24		
161	1.47	11.11	4.93	82.49		
162	1.48	12.09	5.61	80.82	High-oil	114
163	1.29	10.78	5.09	82.84	High-oil	102
164	1 30	9.36	4.34	85.00	Low-protein	110
165	1.47	10 50	4.75	83.28		
166	1.65	11.29	3.84	83.22	Low-oil	106
167	1.37	9.58	4.72	84.33		
168	1.49	10.94	4.34	83.23		
169	1.60	11 79	4.22	82.39		
170	1.36	11.06	4.39	83.19	TT'	110
171	1.44	11.18	5.75	81.63	High-oil	113
172	1.45	12.28	3.99	82.28	High-protein	121
173	1.39	10.14	4.35	84.12	TT' 1 - '1	100
174	1.30 1.40	10.19 12 68	$5.22 \\ 5.29$	83.29	High-oil	106
- 175 176	1.40	9.86	5.29 4.73	80.63	High-protein	109
170	1.37	9.80	4.73	84 04 80.53	High gratain	114
177	1.48	10.93	4.93	80.55 82.94	High-protein	114
178	1.37	10 93	5.03	82.94 81.78		
180	1.32	11.27	4.55	81.78		
180	1.39	9.66	4.35	84.66		
182	1.37	10.97	3.94	83.72	Low-oil	107
183	1.54	10.32	5.46	82.68	High-oil	107
184	1.44	10.68	4.89	82.99	ingiron	100
101	1.44	10.00	7.05	02.99	1	

TABLE 15.—Continued

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TABLE 15.—Continued

					<u> </u>	
A				Carbaha	Dist	Register
Annual ear No.	Ash.	Protein.	Oil.	Carbohy- drates.	Plot assigned.	Register No.
ear no.				urates.	assigneu.	assigned.
185	1.42	9.33	4.49	84.76	Low-protein	109
186	1.48	10.78	4.74	83.00		
187	1.28	10 49	4.44	83.79		
188	1.53	13.10	5.51	79.86	High-protein	115
189	1.32	9.58	5.63	83.47	High-oil	110
190	1.25	11.50	4.95	82.30		
191	1.29	11.19	4.31	83.21	r	101
192	1.51	11.49	4.07	82.93	Low-oil	104
193	1.36	9.47	4 51	84.66	Low-protein	112
194	1.50	11.47	4.65	82.38		
195	1.54	11.09	4.37	83.00	T ann alt	105
196	1.30	9.44 11.20	4.46	85.31 83.08	Low-oil	105
197	1.26		4.40			
198 199	1.44	10.23 10.64	4.67	83.80 83.40		
	1.29	10.04	4.84	83.64		
200	1.39 1.38	9.64	5.22	83 76	Link off	105
201 202	1.38	11.26	4.96	82.39	High-oil	105
202	1.39	10.48	4.59	83.67		
203	1.66	12.57	4.82	80.95	High-protein	118
204	1.46	10.71	5.36	82.47	High-oil	116
205	1.40	10.27	4.65	83.74	ing n-on	110
200	1 25	11.09	4.27	83.39		
208	1.48	12.05	4.78	81.69	High-protein	124
209	1.48	10.22	4.30	84.00	ingn protein	
210	1.45	11.16	4.75	82.64	-	
211	1.48	10.44	4.21	83.87		
212	1.27	9.75	4.12	84 86	Low-oil	111
213	1.53	12.40	4.75	81.32	High-protein	104
214	1.58	10.22	4.43	83.77	0 1	
215	1.45	9.22	4.60	84.73	Low-protein	108
216	1.42	10.27	4.35	83.96		
217	1.32	9.39	4.83	84.46		
218	1.40	9.74	4.71	84.15		
219	1.37	9.92	4.32	84 39		-
220	1.43	9.63	5.23	83.71	High-oil	104
221	1.32	10.33	5.01	83.34		
222	1.41	12.34	4.57	81.68	High-protein	122
223	1.49	10.58	4.64	83.29		
224	1.52	11.36	4.63	82.49		10.1
225	1.33	9.15	4.55	84.97	Low-protein	104
226	1.36	10.31	5 08	83.25		105
227	1.46	12.63	5.15	80.76	High-protein	107
228	1.41	12.16	4.12	82.31	Low-oil	109
229	1.36	11.04	4.52	83.08	TT: -1- must !	102
230	1.43	12.10	4.29	82.18	High-protein	103 、
231	1.33	10.95	4.60	83.12	Ilicale marte!	116
232	1.52	12.76	4.10	81.62	High-protein	116
233	1.40	9.75	4.14	84.71		
234	1.39	10.78	4.76	83.07	Uimh ail	110
235	1.58	9.97	5.27	83.18	High-oil	119
236	1.40	10.18	6.02	82.40	High-oil	112 122
237 238	$1.47 \\ 1.60$	$11.16 \\ 11.42$	5.13 5.20	$82.24 \\ 81.78$	High-oil High-oil	122
200	1.00	11.42	5.20	01.70	ingn-on	121

1908.]

TEN GENERATIONS OF CORN BREEDING.

Register	†By Dam	Protein,	percent.	Register ear No.	†By Dam	Protein,	percent.				
ear No.	No.	Seed ear planted.	Crophar- vested		No.	Seed ear planted.	Crophar- vested.				
101 102 103 104 105 106 107 108 109 110 111 *112 *113		11.89 12.07 12.10 12.40 12.28 12.38 12.63 12.51 12.68 12.79 12.81 13.87 12.96	$\begin{array}{c} 9.61 \\ 11.07 \\ 10.94 \\ 11.48 \\ 10.85 \\ 11.64 \\ 11.46 \\ 11.57 \\ 11.17 \\ 11.14 \\ 11.16 \\ 11.60 \\ 11.31 \\ 11.07 \\ 11.44 \end{array}$	*114 *115 116 117 118 119 120 121 122 123 124		13.06 13.10 12.76 12 40 12.57 12.36 12.42 12.28 12.34 12.21 12.05	{ 10 89 } 10 67 } 10.34 } 11.48 11.05 10.75 10.86 11.07 10.88 11.73 10.76 11 30 11.53				
		L.	(11.44	1							
А	verage of	12.54	11.10								

TABLE 16.-FIRST GENERATION HIGH PROTEIN PLOT RECORD, 1897

*Crop from Reg. Nos. 112, 113, 114, and 115 sampled in duplicate. †First generation not known.

[September,

	I KUIEI	N FLOT C	I 1097			
Annual Protein, Regist ear No. percent. No. assign	loar No	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
By Dam 101	1	By Dum	111	By Dam 117		
271 8.82 272 8.42 273 11.60 274 8.34	321 322 323 324	11.43 10.94 11.18 11.55		371 372 373 374	11.75 9.46 11.17 8.67	
By Dam 102		ly Dùm :	112	B	y Dam 1	18
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	326 327 328 329	13.62 10.99 11 07 9.18	212	376 377 378 379	10.47 10.92 9.32 12.28	218
By Dam 103	* 1	By Dam	112		y Dam	119
281 12.62 208 282 10.43 283 9.87 284 11.58 284 283	331 332 333 334	$ \begin{array}{c c} 11.40 \\ 12.24 \\ 10.06 \\ 11.02 \end{array} $	205	381 382 383 384	9.31 11.00 12.23 11.99	221 201
By Dam 104	1	By Dam	113	B	y Dam	120
286 10.97 287 11.08 288 10.23 289 12.99 214	336 337 338 339	10.78 11.28, 11.09 12.85	210	386 387 388 389	12.10 9.20 9.76 9.18	203
By Dam 105	*]	By Dam	113	B	y Dam	121
29111.5229210.4429311.9229411.25	341 342 343 344	11.65 11.35 10.60 12.16	220	391 392 393 394	12.46 11.14 10.03 13.27	207
By Dam 106		By Dam	114	B	y Dam	1 1.2.2
296 11.11 297 12.07 222 298 13.58 213 299 11.68 213	11 0.11	11.63 12.26 8.76 10.69	204	396 397 398 299	9.94 11.78 11.30 11.08	
By Dam 107	*]	By Dam	114	$\ $ B	y Dam	123
301 10.80 302 12.26 219 303 11.20 304 11.97	351 352 353 354	11.39 10.59 9.65 9.83		401 402 403 404	$\begin{array}{c c}11.23\\10.92\\9.72\\11.14\end{array}$	
Dy Dam 108	0.45	By Dam	115		y Dam	124
3% 12.33 20% 307 12.39 217 308 9.64 309 9.93	356 357 358 359	8.63 11.08 11.39 9.12		406 407 408 409	$ \begin{array}{c} 10.44 \\ 12.72 \\ 12.80 \\ 11.17 \end{array} $	216 209 .
By Dam 109	*]	By Dam	115			
311 10.65 312 11.05 313 9.89 314 10.22	361 362 363 364	11.63 9.98 10.45 11.89	224			
By Dam 110	1	By Dam	116			
316 11.08 317 10.29 318 11.72 319 8.76	366 367 368 369	12.01 9.51 11.43 11.76	202			

TABLE 17.—PROTEIN IN ONE HUNDRED TWELVE INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1897

*An extra set of ears were analyzed from Dams 112, 113, 114 and 115.

1908.] TEN GENERATIONS OF CORN BREEDING.

Register	By Dam	Protein,	percent.	Register	By Dam	Protein,	percent.					
ear No.	No.	Seed ear planted.	Crop har- vested.	ear No.	No.	Seed ear planted.	Crophar- vested.					
201 202 203 204 205	119 116 120 114 112	11.99 12.01 12.10 12.26 12.24	11.18 10.86 10.64 11.26 11.61	*213 *214 215	106 104 102	13.58 12.99 12.83	$ \begin{cases} 11.74 \\ 11.42 \\ 11.42 \\ 11.42 \\ 11.20 \\ 11.34 \end{cases} $					
206 207 208 209 210	108 121 103 124 113	12.33 12.46 12.62 12.80 12.85	11.24 11.26 10 80 10.55 10 92	216 217 218 219 220	124 108 118 107 113	$12.72 \\ 12.39 \\ 12.28 \\ 12.26 \\ 12.16$	10.77 11.03 10.96 10.47 10.33					
*211	, 121	13.27	${11.06 \\ 10.67}$	221 222	119 106	12.23 12.07	11.58 9 78					
*212	112	13.62	{11.17 {12.48	223 224	107 115	11.97 11.89	10.72 10.95					
Averag	e of plot					12.49	11.05					

TABLE 18.—SECOND GENERATION HIGH PROTEIN PLOT RECORD, 1898

*Crop from Reg. Nos. 211, 212, 213, and 214 were sampled in duplicate.

[September,

			· · · · · · · · · · · · · · · · · · ·					
Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
Б	y Dam	201	B	y Dam 2	206	· By	J Dam 2	11
821 822 823 824 825 826 827 828 829	$\begin{array}{c} 9.82 \\ 10.38 \\ 10.46 \\ 11.08 \\ 10.79 \\ 12.83 \\ 12.50 \\ 7.84 \\ 12.07 \end{array}$	305	871 872 873 874 875 876 876 877 878 878 879	$\begin{array}{c} 12.82\\ 11.65\\ 10.21\\ 10.13\\ 10.49\\ 10.58\\ 11.20\\ 10.61\\ 12.01\\ \end{array}$	321	921 922 923 924 925 926 927 928 929	$11.29 \\ 9.69 \\ 9.78 \\ 10.18 \\ 11.54 \\ 11.93 \\ 12.29 \\ 11.39 \\ 10.98$	
1	3y Dam	202	I	By Dam	207	*B	y Dam 2	11
831 832 833 834 835 836 837 838 838 839	$ \begin{array}{c} 10.19 \\ 9.66 \\ 9.97 \\ 11.92 \\ 11.47 \\ 10.76 \\ 12.04 \\ 11.58 \\ 9.39 \end{array} $		881 882 883 884 885 886 886 887 888 888 889	$ \begin{array}{c} 10.76\\ 11.38\\ 11.22\\ 9.60\\ 12.45\\ 13.67\\ 9.90\\ 11.08\\ 11.59 \end{array} $	323	931 932 933 934 935 936 937 938 939	$ \begin{array}{c} 11.98\\ 11.05\\ 10.04\\ 9.84\\ 9.96\\ 11.01\\ 11.22\\ 11.09\\ 8.76 \end{array} $	-
L	By Dam	203	By Dam 208			B	y Dam 2	? 12
841 842 843 844 845 846 846 847 848 849	$ \begin{array}{c} 11.17 \\ 10.88 \\ 10.39 \\ 10.91 \\ 13.05 \\ 7.72 \\ 9.48 \\ 8.92 \\ 9.63 \end{array} $	308	891 892 893 894 895 896 896 897 898 899	$10.40 \\ 12.09 \\ 9.98 \\ 9.06 \\ 13.46 \\ 10.54 \\ 9.93 \\ 9.28 \\ 11.64$	314	941 942 943 944 945 946 947 948 949	9.84 10.84 11.69 8.75 14.92 11.36 13.04 10.12 8.89	312
• 1	By Dam	204	By Dam 209			*By Dam 212		
851 852 853 854 855 856 857 858 859	$ \begin{vmatrix} 12.48 \\ 10.31 \\ 12.03 \\ 11.78 \\ 11.22 \\ 10.60 \\ 11.27 \\ 9.81 \\ 9.69 \end{vmatrix} $	• 303	901 902 903 904 905 906 907 908 909	$\begin{array}{c} 9.90 \\ 10.33 \\ 11.48 \\ 12.55 \\ 8.89 \\ 11.95 \\ 10.84 \\ 9.15 \\ 10.02 \end{array}$	322	951 952 953 954 955 956 957 958 959	$ \begin{vmatrix} 14.25 \\ 9.83 \\ 13.21 \\ 12.91 \\ 10.37 \\ 11.50 \\ 10.69 \\ 11.94 \\ 14.05 \end{vmatrix} $	313 309 311
	By Dam	205	ز	By Dam	210	B	y Dam	213
861 862 863 864 865 866 867 868 869	$\begin{array}{c} 11.18\\ 12.10\\ 11.55\\ 13.04\\ 11.08\\ 11.73\\ 11.48\\ 11.78\\ 10.64\\ \end{array}$	317	911 912 913 914 915 916 917 918 919	$ \begin{array}{c} 11.66 \\ 11.06 \\ 10.02 \\ 10.08 \\ 11.83 \\ 11.09 \\ 11.45 \\ 10.75 \\ 9.67 \end{array} $		961 962 963 964 965 966 967 968 969	$ \begin{array}{c} 12.97 \\ 13.25 \\ 12.66 \\ 11.68 \\ 9.29 \\ 9.89 \\ 12.12 \\ 12.29 \\ 9.71 \end{array} $	306 315

TABLE 19.—PROTEIN IN TWO HUNDRED FIFTY-TWO INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1898

1908.]

				-				
Annual	Protein,	Register No.	Annua1	Protein,	Register No.	Annual	Protein,	Register
ear No.	percent.	assigned.	ear No.	percent.	assigned.	ear No.	percent.	assigned.
*1	By Dam	213	1	By Dam	217	1	By Dam	222
971	10.55	1	1021	10.06		1071	8.07	1
972	11.80		1022	12.24		1072	11.48	
973	9.47		1023	10.25		1073	10.95	
974	11.97		1024	11.84		1074	10.47	
975	11.94		1025	11.50		1075	10.90	
976	12.98	319	1026	11.23		1076	10.17	
977	10.96		1027	9.66		1077	10.84	
978	11.43		1028	11.91		1078	7.83	
979	12.16		1029	9.86		1079	9.06	
By Dam 214			Ŀ	By Dam	218	1	By Dam	223
981	11.80		1031	11.74		1081	11.44	1
982	11.58		1032	11.53		1082	9.97	
983	10.12		1033	10.15		1083	11.55	
984	13.12	316	1034	8.90		1084	9.94	
985	13.34	310	1035	9.93		1085	11.27	
986	10.95		1036	10.46		1086	11.57	
987	11.38		1037	10.47		1087	10.53	•
988	11.17		1038	11.72		1088	9.36	
989	10.11		1039	12.39	302	1089	10.61	
*)	By Dam	214	1	By Dam	219	1	By Dam	224
991	11.39	r	1041	8.70	r l	1091	8.74	I
992	9.86		1042	10.98		1092	9.50	
993	10.69		1043	8.63		1093	10.20	
994	10.75		1044	12.16		1094	10.60	
995	12.42		1045	12.35	301	1095	11.49	
996	10.42		1046	10.10		1096	12.74	304
997	11.72		1047	9.54		1097	10.47	
998	12.20		1048	10.83		1098	12.07	
999	10.96		1049	10.68		1099	12.36	
I	By Dam	215	1	By Dam	220			
1001	11.85		1051	10.87				
1002	11.42		1052	9.63				
1003	10.39		1053	8.61				
1004	12.88	320	1054	10.31				
1005	9.32		1055	12.37	324			
1006	11.04		1056	10.28				
1007	12.75		1057	11.85				
1008	10.33		1058 1059	$11.26 \\ 9.80$				
1009	12.69				l		•	
	y Dam			by Dam	221			
1011	12.99	318	1061	12.78	207			
1012	9.96		1062	13.03	307			
1013	9.71		1063	11.72				
1014	10.78		1064	10.58				
1015	11.51		1065	10.95				
1016	11.39		1066 1067	11 ⁰ .50 12.04				
$\begin{array}{c} 1017 \\ 1018 \end{array}$	9.81		1067	12.04				
1018	11.29		1068	11.43				
1017	1 11.45	l	1005	11.12		1		

TABLE 19.—Continued.

*An extra set of ears were analyzed from Dams 211, 212, 213 and 214.

[September,

		Protein,	percent			Protein,	Protein, percent.	
Register ear No.	By Dam No.	Seed ear planted.	Crop har- vested.	Register ear No.	By Dam No.	Seed ear planted.	Crop har- vested.	
301 302 303 304 305 306 307 308 309 310 311 312	219 218 204 224 201 213 221 203 212 214 212 214 212 212	$12.35 \\ 12.39 \\ 12.48 \\ 12.74 \\ 12.83 \\ 12.97 \\ 13.03 \\ 13.05 \\ 13.21 \\ 13.34 \\ 14.05 \\ 14.92 \\ \bullet$	$\begin{array}{c} 10.09\\ 10.17\\ 11.50\\ 11.00\\ 10.89\\ 11.35\\ 11.91\\ 10.56\\ 12.04\\ 11.37\\ 12.78\\ 12.21\\ \end{array}$	313 314 315 316 317 318 319 320 321 322 323 324	$\begin{array}{c} 212\\ 208\\ 213\\ 214\\ 205\\ 216\\ 213\\ 215\\ 206\\ 2^{1}9\\ 207\\ 220\\ \end{array}$	$14.25 \\ 13.46 \\ 13 25 \\ 13.12 \\ 13.04 \\ 12.99 \\ 12.98 \\ 12.82 \\ 12.82 \\ 12.55 \\ 12.45 \\ 12.37 \\ 12.37 \\ 12.37 \\ 12.37 \\ 13.46 \\ 13.4$	$\begin{array}{c} 10.74 \\ 11.09 \\ 11.42 \\ 11.77 \\ 12.50 \\ 11.88 \\ 12.68 \\ 12.09 \\ 11.89 \\ 10.22 \\ 12.24 \\ 10.76 \end{array}$	
		Average	·		13.06	11.46		

TABLE 20.-THIRD GENERATION HIGH PROTEIN PLOT RECORD, 1899

1908.] TEN GENERATIONS OF CORN BREEDING.

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		PROTEIN PLOT OF 1899										
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			Register		1	Register			Register			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			No.	ear No.	percent.	No. assigned.	ear No.	percent.	No.			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1	By Dam	301	1	By Dam	306	1	By Dam	311			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$									420			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$									407			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$												
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$									411			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$						401						
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$						401						
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$												
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$						405						
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	E	By Dam	302	1	By Dam	307	E	By Dam	312			
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	1611	9.91		1661	13.41	403	1711	12.37				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		8.35		1662	12.75		1712	12.83				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$												
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$						_						
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$												
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$\begin{array}{c c c c c c c c c c c c c c c c c c c $												
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	E		303				· ·		313			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				1671	11.32	-	2					
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$												
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	1623	9.94		1673	12.30		1723					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $												
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$						[
$\begin{array}{c c c c c c c c c c c c c c c c c c c $												
$\begin{array}{c c c c c c c c c c c c c c c c c c c $												
$\begin{array}{c c c c c c c c c c c c c c c c c c c $												
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			304			300			14			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $							1					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									424			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						404						
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$				1684	12.88							
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				1685					-			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $												
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$						402						
By Dam 305By Dam 310By Dam 315 1641 11.04 1691 11.90 1741 10.13 1642 12.13 1692 11.35 1742 10.50 1643 10.50 1693 12.97 1743 11.41 1644 11.15 1694 10.07 1744 8.74 1645 9.97 1695 12.21 1745 11.96 1646 11.31 1696 12.53 1746 13.73 418 1647 10.81 1697 11.93 1747 11.76 1648 11.55 1698 11.37 1748 10.16												
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$			205				_		175			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			305			10		-	13			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$												
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$												
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$												
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$							_					
1647 10.81 1697 11.93 1747 11.76 1648 11.55 1698 11.37 1748 10.16									418			
				1697								
1649 10.66 1699 10.56 1749 11.20			1									
	1649	10.66		1699	10.56		1749	11.20				

TABLE 21.—PROTEIN IN TWO HUNDRED SIXTEEN INDIVIDUAL EARS FROM HIGH-

[September,

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.			
Ŀ	By Dam	316	E	By Dam	319	By Dam 322					
1751	11.12		1781	12.26		1811	11.17				
1752	11.30		1782	13.89	417	1812	11.89				
1753	11.78		1783	10.69		1813	13.51	419			
1754	11.85		1784	12.29		1814	10.95				
1755	12.16	-	1785	14.24	414	1815	11.84				
1756	13.48	421	1786	13.89	416	1816	10.60				
1757	11.23		1787	11.83		1817	12.00				
1758	11.02	•	1788	14.20		1818	9.76				
1759	11.97		1789	12.66		1819	11.19				
By Dam 317			By Dam 320			By Dam 323					
1761	12.32		1791	13.97	410	1821	14.53	413			
1762	12,46		1792	12.35		1822	11.31				
1763	14.78	412	1793	11.62		1823	11.95				
1764	12.70		1794	11.69		1824	10.44				
1765	12.49		1795	11.61		1825	13.31	423			
1766	12.67		1796	12.07		1826	10.46				
1767	12.04		1797	10.72		1827	11.53				
1768	12.96		1798	12.92		1828	13.02				
1769	13.41	422	1799	12.10		1829	12.01				
Ŀ	By Dam	318	E E	By Dam	321	B	By Dam	324 .			
1771	10.85		1801	13.93	415	1831	10.09				
1772	12.88		1802	12.42		1832	11.61				
1773	11.81		1803	10.65		1833	10.81				
1774	12.86		1804	13.63	406	1834	10.81				
1775	13.05		1805	10.90		1835	10.96				
1776	11.84		1806	11.99		1836	10.35				
1777	12.66		1807	10.54		1837	12.78				
1778	11.73		1808	12.80		1838	11.15				
1779	12.32		1809	10.94		1839	9.62				

TABLE 21.—Continued.

TABLE 22.—FOURTH GENERATION HIGH PROTEIN PLOT RECORD, 1900.

D	D D	Protein,	percent.	D	r By Dam	Protein,	percent.
Register ear No.	By Dam No.	Seed ear	Crop har-		No.	Seed ear	Crophar-
		planted.	vested.			planted.	vested.
401	306	13.22	12.27	413	323	14.53	13.50
402	309	13.31	12.56	414	319	14.24	12.34
403	307	13.41	12.44	415	321	13.93	12.44
404	309	13.48	11.62	416	319	13.89	12.24
405	306	13.36	11.53	417	319	13.89	12.76
406	321	13.63	12.00	418	315	13.73	12.21
407	311	13.74	12.90	419	322	13.51	12.37
408	309 •	13.87	12.09	420	311	13.46	12.13
409	314	13.94	11.70	421	316	13.48	12.38
410	320	13.97	11.95	422	317	13.41	12.26
411	311	14.41	12.87	423	323	13.31	12.71
412	317	14.78	12.86	424	314	13.19	11.63
		Average		·	13.74	12.32	

1908.] TEN GENERATIONS OF CORN BREEDING.

TABLE 23 .- PROTEIN IN TWO HUNDRED SEXTEEN INDIVIDUAL EARS FROM HIGH-. PROTEIN PLOT OF 1900

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
B	y Dam 4	101	1	By Dam .	406	1	By Dam	411
2801 2802 2803 2804 2805 2806 2807 2808 2809	$12.22 \\13.09 \\14.35 \\12.05 \\12.57 \\11.20 \\12.31 \\12.54 \\11.87 \\$	514	2851 2852 2853 2854 2855 2856 2857 2858 2859	$12.55 \\ 12.28 \\ 11.14 \\ 13.30 \\ 10.56 \\ 12.82 \\ 12.15 \\ 13.34 \\ 11.61$		2901 2902 2903 2904 2905 2906 2907 2908 2909	$12.31 \\ 15.21 \\ 12.72 \\ 12.93 \\ 12.45 \\ 14.43 \\ 12.43 \\ 12.72 \\ 13.45 \\ 13.45 \\ 12.52 \\ 13.45 \\ 12.52 \\ 13.45 \\ 12.52 \\ 13.45 \\ 12.52 \\ 13.45 \\ 12.52 \\ 13.45 \\ 12.52 \\ 13.45 \\ 12.52 \\ 13.45 \\ 12.52 \\ 13.45 \\ 12.52 \\ 13.45 \\ 12.52 \\ 13.45 \\ 12.52 \\ 12.5$	506 513
	y Dam 4	102	1	By Dam	407		By Dam	
2811 2812 2813 2814 2815 2816 2817 2818 2819	$14.10 \\ 14.01 \\ 12.34 \\ 12.45 \\ 11.99 \\ 14.06 \\ 11.93 \\ 13.13 \\ 13.30$	515	2861 2862 2863 2864 2865 2866 2867 2868 2869	11.44 13.31 14.63 13.53 13.11 11.75 12.99 13.43 13.63	510	2911 2912 2913 2914 2915 2916 2917 2918 2919	$14.54 \\ 13.31 \\ 11.31 \\ 12.64 \\ 13.71 \\ 12.56 \\ 11.79 \\ 12.87 \\ 15.20$	503 509
B	y Dam 4	103		By Dam	408	В	y Dam 4	113
2821 2822 2823 2824 2825 2826 2827 2828 2829	$11.82 \\ 14.09 \\ 13.32 \\ 13.72 \\ 14.56 \\ 11.30 \\ 13.55 \\ 11.64 \\ 12.48$	511	2871 2872 2873 2874 2875 2876 2876 2877 2878 2879	$13.63 \\13.11 \\10.59 \\12.55 \\12.19 \\10.88 \\12.57 \\12.13 \\13.90$		2921 2922 2923 2924 2925 2926 2927 2028 2929	12.47 14.98 14.45 14.38 13.22 15.40 15.71 12.48 13.58	505 512 501 508 507
В	y Dam 4	104		By Dam	409	B	y Dam 4.	14
2831 2832 2833 2834 2835 2836 2837 2838 2839	$11.45 \\ 11.86 \\ 12.11 \\ 13.70 \\ 11.54 \\ 11.90 \\ 12.63 \\ 11.63 \\ 12.86 \\$		2881 2882 2883 2884 2885 2886 2887 2888 2889	11.26 12.53 11.85 12.54 13.04 11.45 11.22 10.31 13.77		2931 2932 2933 2934 2935 2936 2937 2938 2939	$14.17 \\10.89 \\11.51 \\12.98 \\14.19 \\14.30 \\13.02 \\11.92 \\11.69$	
1	By Dam	405		By Dam	410	E	By Dam	415
2841 2842 2843 2844 2845 2846 2845 2846 2847 2848 2849	$\begin{array}{c} 11.35\\ 11.62\\ 11.31\\ 13.05\\ 12.54\\ 11.47\\ 11.54\\ 12.53\\ 12.60\\ \end{array}$		2891 2892 2893 2894 2895 2896 2897 2898 2899	$\begin{array}{c} 14.43\\ 11.24\\ 11.55\\ 11.42\\ 11.70\\ 11.79\\ 11.75\\ 12.56\\ 12.11\\ \end{array}$	502	2941 2942 2943 2944 2945 2945 2945 2946 2947 2948 2949	$\begin{array}{c} 13.24\\ 13.03\\ 13.21\\ 12.53\\ 13.96\\ 13.39\\ 12.39\\ 13.53\\ 12.92 \end{array}$	

503

[September,

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	
В	y Dam	<i>116</i>		By Dam 419			By Dam 422		
2951 2952 2953 2954 2955 2956 2957 2958	13.37 12.58 11.74 12.29 11.63 11.99 12.14 12.35		2981 2982 2983 2984 2985 2986 2987 2988 2988	12.34 13.03 12.37 13.00 14.59 12.73 13.30 12.01	504	3011 3012 3013 3014 3015 3016 3017 3018	$13.73 \\12.30 \\11.96 \\12.78 \\12.88 \\11.10 \\12.86 \\12.16 \\12.20 \\12.20 \\12.16 \\12.20 \\$		
2859 <i>B</i>	11.91 y Dam 4	17	2889	12.23 By Dam .	120	3019	13.22 By Dam .	123	
2961 2962 2963 2064 2965 2966 2967 2968 2969	13.85 11.74 12.43 12.16 12.36 13.44 13.40 14.01 12.87		2991 2992 2993 2994 2995 2996 2997 2998 2999	$\begin{array}{c} 12.29\\ 12.48\\ 12.22\\ 12.66\\ 12.52\\ 12.75\\ 13.01\\ 12.15\\ 11.79\\ \end{array}$		3021 3022 3023 3024 3025 3026 3027 3028 3029	$\begin{array}{c} 11.81\\ 11.90\\ 13.01\\ 12.29\\ 11.74\\ 13.01\\ 13.54\\ 13.89\\ 13.50\end{array}$		
B	y Dam 4	18	1	By Dam	121	1	By Dam	124	
2971 2972 2973 2974 2975 2976 2977 2878 2979	$\begin{array}{c} 12.23 \\ 13.47 \\ 12.36 \\ 12.17 \\ 12.73 \\ 12.16 \\ 11.59 \\ 10.52 \\ 13.81 \end{array}$		3001 3002 3003 3004 3005 3006 3007 3008 3009	12.89 12.66 13.10 13.68 11.82 12.77 11.67 13.16 13.31		3031 3032 3033 3034 3035 3036 3037 3038 3039	$12.49 \\10.98 \\11.24 \\11.44 \\13.00 \\12.11 \\11.98 \\9.34 \\11.46$		

TABLE 23.—Continued

TABLE 24.-FIFTH GENERATION HIGH PROTEIN PLOT RECORD, 1901

		Protein, percent.		Deteter	n-n	Protein,	Protein, percent.	
Register ear No.	By Dam No.	Seed ear planted.	Crop har- vested.	Register ear No.	No.	Seed ear planted.	Crop har-	
501 502	413 410	14.38 14.43	14.78 13.76	508 509	413 412	15.40 15.20	15.21 14.22	
503 504	412 419	14.54 14.59	14.10 15.02	510 511	407 403	14.63 14.56	13.61 13.83	
505 506	413 411	14.98 15.21	13.37 14.07	512 513	413 411	14.45 14.43	14.19 13.61	
507 	413	15.71	14.44	514 *515	401 402	14.35 14.01	13.46 13.37	
-		Average	e of plot.			14.78	14.12	

*Planted in Special High-Protein Plot:-not included in average.

TEN GENERATIONS OF CORN BREEDING.

TABLE 25.—PROTEIN IN SIXTY INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1901 AND SEVENTY-TWO ADDITIONAL EARS FROM SPECIAL HIGH-PROTEIN PLOT

Annual ear No.	Protein, percent.	Register No. assigned	Annual ear No.	Protein, percent.	Register No assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
B	y Dam	501	В	y Dam	509	3563 3564	12.70 10.60	
3611	14.78	1	3691	15.03	613	3565	13.69	
3612	16.03		3692	13.77		3566	14.78	
3613	13.57		3693	12.84		3567	13.61	
3614	14.84			Dame		3568	15.27	
		1	D	y Dam	510	3569	12.75	
R	y Dam	502	3701	12.19		3591	14.62	
2	y Dum	302	3702	14.85		3592	13.93	
3621	13.15		3703	14.33		3593	15.05	602
	1	1	3704	12.36		3594	13.26	001
B_{i}	y Dam	503	3705	14.56		3595	14.71	
2621	1 1 1 1 2	1	3706	13.00		3596	13.18	
3631	14.12		R	y Dam	err ·	3597	14.98	
3632	13.62			y Dum	511	3598	12.49	
R	y Dam	504	3711	14.35		3599	15.58	605
D	y Dum	304	3712	11.59				
3641	15.51	610	3713	11.80			y Dam	515
3642	14.64		3714	13.24			n in Speci	
3643	14.68			1	1	-	Protein Pl	ot.
3644	14.89			y Dam	512	3521	13.73	
3645	14.85		3721	12.63	r	3522	12.73	
3646	14.27		3722	15.80	608	3523	13.46	
3647	12.78		3723	12.67	000	3524	13.87	
3648	* 14.22		3724	15.65	609	3525	13.12	~
7						3526	14.93	614
• <i>B</i>	y Dam	505	B	y Dam	513	3527	11.56	
3651	13.02	r				3528	13.40	
3652	12.17		3731	13.99		3529	13.93	
3653	14.63		3732	14.51		3541	13.78	
3654	13.57		3733	12.01 12.86		3542	11.78	
3655	12.94		3734			3543	12.80	
3656	12.96		3735	14.27		3544	13.54	
3657	12.80		B	y Dam	514	3545	13.16	
3658	13.14		3741	11.50	1	3546	13.47	
3659	13.56		3742	14.37		3547	12.21	
7	Den Denne		3743	13.86		3548	13.09	
D	y Dam	300	3744	13.34	•	3549	11.76	
3661	15.41	604	U.I.I	10.01		3551	14.88	
3662	13.20		B	y Dam	507	3552 3553	13.85	
3663	11.82			n in Speci	· ·		11.08	
3664	14.17			Protein P.		3554 3555	12.23	
	ł	1		13.29	1	3556	13.28	
B	y Dam	507	3531 3532	13.29		3557	13.20	
2671	1 4 4 11 4		3533	11.96		3558	14.61	
3671	14.54		3534	14.25		3559	14.80	
3672	14.88		3535	13.84		3571	14.69	
E	y Dam	co8 .	3536	15.17	612	3572	12.08	
D	y Dum	300	3537	15.00	601	3573	11.18	
3681	13.47		3538	16.12	607	3574	13.67	
3682	15.38		3539	14.20		3575	13.07	
3683	15.49		3561	12.86		3576	8.94	
3684	14.51		3562	15.40	611	3577	13.58	
		1						

1908.]

[September,

Annual ear No.	Protein, percent.	Register No. assigned.
3578 3579	13.33	606
3581 3582	12.17 15.01	000
3583 3584	13.58 13.75	
3585 3586	15.21 13.82	603
3587 · 3588	13.13 14.77	
3589	14.12	

TABLE 25.—Continued.

TABLE 26.—STXTH GENERATION HIGH PROTEIN PLOT RECORD, 1902

1		Protein, percent.		-	By Dam	Protein,	Protein, percent.	
Register ear No.	By Dam No.	Seed ear planted.	Crop har- vested.	Register ear No.	By Dam No.	Seed ear planted.	Crop har- vested.	
601 603 604 605 606 607	507 507 515 506 507 515 507	$15.00 \\ 15.05 \\ 15.21 \\ 15.41 \\ 15.58 \\ 15.76 \\ 16.12$	12.47 12.83 11.59 12.44 12.32	608 609 610 611 612 613 614	512 512 504 507 507 509 515	$15.80 \\ 15.65 \\ 15.51 \\ 15.40 \\ 15.17 \\ 15.03 \\ 14.93$	12.44 11.76 13.17 11.93 12.42	
	Ave	15.39	12.34					

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TABLE	27.—PROTEIN	IN	NINETY	INDIVIDUAL	Ears	FROM	HIGH-PROTEIN	Plot
				OF 1902				

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
Б	ly Dam	601	E	By Dam	605	By Dam 611		
4171 4172	13.07		4201 4202	13.44	707	4241 4242	12 81 14.29	708
4173 4174	12.82 14.70	710	4203 4204	13.76 13.50	720	4243 4244	12 76 14 49	709
4175	13.51	110	4205	13 32		4245	13.79	703
4176 4177	13.51 12.29		4206 4207	13 47 13 13		4246 4247	13.19 10.48	
4178 4179	13.62 13.38		4208 4209	13.32 13.06		4248 4249	13.70 12.68	701
	Ry Dam	602		By Dam	607		y Dam	1 512
4181	12.11	1	4211	13.14		4251	12.28	1
4182 4183	13.80 11.84	719	4212 4213	14.62 13.86	713 704	4252 4253	12.15	711
4184	12 32		4214	13 31		4254	12.50	111
4185 4186	13.72 12_86	721	4215 4216	$14 12 \\ 14 02$	716 717	4255 4256	12.02 13.22	
4187	14.25	715	4217	11.50		4257	12.49	
4188 4189	13.30	712	4218 4219	14 37 13.66	714	4258 4259	11.04	
E	ly Dam	604	E	By Dam	609	B	y Dam o	513
4191 4192	11.77 12.32		4221 4222	13 28 13.30	[4261 4262	11 .60 12 .36	
4193	13.28		4223	10.88		4263	12.99	
4194 4195	13.08 12.16		4224 4225	13.42 13.76	702	4264 4265	13.67 13.98	705
4196	11.69		4226	13.45		4266	12.36	100
4197 4198	12.54 12.73		4227 4228	14.03	706	4267 4268	12.91 12.53	
4199	9.99		4229	12.99]	4269	13.02]
			4231	<i>By Dam</i> 13,89	610 718			
			4232	13.68	710			
			4233	11.00 9.80				
			4235	13.12				
			4236 4237	11.79 11.86				
			4238	9.54				
			4239	12 17		1		

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TABLE 28.—SEVENTH GENERATION HIGH PROTEIN PLOT RECORD, 1903

Desister	By Dam No.	Protein,	percent.	Pomiator	ByDam	Protein,	percent.
ear No.		Seed ear planted.	Crop har- vested.	ear No.	No.	Seed ear planted.	Crop har- vested.
701 702 703 704 705 706 707 708 709 710 711	$\begin{array}{c} 611\\ 609\\ 611\\ 607\\ 613\\ 609\\ 605\\ 611\\ 611\\ 601\\ 612\\ \end{array}$	$\begin{array}{c} 13.70\\ 13.76\\ 13.79\\ 13.86\\ 13.98\\ 14.03\\ 14.22\\ 14.29\\ 14.49\\ 14.70\\ 15.01 \end{array}$	13.22 12.76 13.74 14.61	712 713 714 715 716 717 718 719 720 721 722	602 607 607 607 607 607 610 602 605 602 610	$14.75 \\ 14.62 \\ 14.37 \\ 14.25 \\ 14.12 \\ 14.02 \\ 13.89 \\ 13.80 \\ 13.76 \\ 13.72 \\ 13.68 \\$	13.63 14.03 11.20 12.40 12.30 12.47
			1 selected :			14.30	13.04

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
В	y Dam	705	E	By Dam	712	B	y Dam	717
$ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 10 \\ \end{array} $	$\begin{array}{c c} 13.68\\ 11.98\\ 14.42\\ 14.40\\ 14.60\\ 12.64\\ 11.49\\ 11.39\\ 13.44\\ 13.49 \end{array}$	822	41 42 43 44 45 46 47 48 49 50	$ \begin{array}{c} 13.02 \\ 12.30 \\ 12.02 \\ 12.71 \\ 13.94 \\ 12.78 \\ 14.30 \\ 13.77 \\ 14.37 \\ 13.14 \end{array} $		81 82 83 84 85 86 87 88 89 90	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	818 804
B	y Dam	706	E	By Dam	713	B	y Dam	718
11 12 13 14 15 16 17 18 19 20	$\begin{array}{c} 14.42\\ 11.35\\ 12.96\\ 13.85\\ 12.57\\ 11.18\\ 15.34\\ 12.22\\ 15.40\\ 14.75\\ \end{array}$	808 813 801	51 52 53 54 55 56 57 58 59 60		819 806 802 820	91 92 93 94 95 96 97 98 99 100	$\begin{array}{c} 14.26\\ 14.38\\ 15.23\\ 13.91\\ 13.98\\ 10.93\\ 10.84\\ 12.68\\ 10.37\\ 11.62\\ \end{array}$	816
В	y Dam	709	B	Ry Dam	714		1	
21 22 23 24 25 26 27 28 29 30	$\begin{array}{c} 13.58\\ 14.95\\ 11.87\\ 15.30\\ 12.51\\ 14.34\\ 15.12\\ 15.55\\ 15.38\\ 14.83\\ \end{array}$	805 815 817 812 809 803	$\begin{array}{c} 61 \\ 62 \\ 63 \\ 64 \\ 65 \\ 66 \\ 67 \\ 68 \\ 69 \\ 70 \end{array}$		· ·			
B	y Dam	710	В	y Dam	716			
31 32 33 34 35 36 37 38 39 40	$14.76 \\ 13.42 \\ 15.37 \\ 17.33 \\ 14.56 \\ 13.80 \\ 15.45 \\ 14.08 \\ 11.47 \\ 14.40$	821 814 811 810	71 · 72 73 74 75 76 77 78 79 80	$\begin{array}{c} 11.09\\ 11.01\\ 14.50\\ 13.76\\ 12.28\\ 13.68\\ 15.24\\ 12.37\\ 14.34\\ 12.69\\ \end{array}$	807		•	

TABLE 29.—PROTEIN IN ONE HUNDRED INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1903

TABLE 30.—EIGHTH GENERATION HIGH PROTEIN PLOT RECORD, 1904

Register	By Dam	Protein,	percent.	Register	By Dam	Protein,	Protein, percent.		
ear No. No.		Seed ear planted.	Crophar- vested	ear No.	No.	Seed ear planted.	Crophar- vested.		
801 802 803 804 805 806 807 808 809 810 811	706 713 709 717 709 713 716 706 706 709 710 710	$\begin{array}{c} 14.75\\ 14.76\\ 14.83\\ 14.88\\ 14.95\\ 15.21\\ 15.24\\ 15.34\\ 15.38\\ 15.45\\ 17.33 \end{array}$	15.19 14.99 13.79 14.32 16.39	812 813 814 815 816 817 818 819 820 821 822	709 706 710 709 718 709 717 713 713 713 710 705	$\begin{array}{c} 15.55\\ 15.40\\ 15.34\\ 15.30\\ 15.23\\ 15.12\\ 14.90\\ 14.85\\ 14.78\\ 14.76\\ 14.60\\ \end{array}$	15.56 15.41 14.70 14.96 14.99		
	Aver	15.39	15.03						

TEN GENERATIONS OF CORN BREEDING.

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
Б	ly Dam	803	Ŀ	By Dam	809	B	y Dam	816 .
· 1 2 3 4 5 6	13.88 14.10 15.54 16.41 16.89	907	31 32 33 34 35	13.68 16.35 14.77 14.65 15.69	921	71 72 73 74	14.83 14.07 14.38 15.17	
6 7 8 9 10	$ \begin{array}{c} 10.39\\ 15.30\\ 17.00\\ 13.48\\ 14.64\\ 15.38 \end{array} $	904 913	35 36 37 38 39 40	$13.69 \\ 13.81 \\ 14.64 \\ 16.57 \\ 15.64 \\ 14.18$. 918	75 76 77 78 79 80	16.24 13.52 14.20 13.12 13.40 12.94	909
В	y Dam	806	Ŀ	sy Dam	811	B	v Dam	818
11 12 13 14 15	$16.60 \\ 13.90 \\ 16.77 \\ 15.43 \\ 14.06$	906 924	41 42 43 44 45	17.79 17.07 14.74 15.83 17.53	916 902	81 82 83 84 85	$13.22 \\ 15.43 \\ 15.97 \\ 14.63 \\ 13.07$	911
16 17 18 19 20	$14.28 \\ 15.10 \\ 14.00 \\ 14.46 \\ 13.18$		46 47 48 49 50	$17.73 \\ 14.41 \\ 16.26 \\ 16.71 \\ 17.38$	914 905	86 87 88 89 90	$13.43 \\ 16.76 \\ 15.18 \\ 14.65 \\ 15.15 $	922
В	y Dam	808	E	By Dam	812	B	y Dam 8	820
21 22 23 24 25 26 27 28 29 30	$\begin{array}{c} 16.49\\ 12.72\\ 14.21\\ 14.77\\ 13.80\\ 13.75\\ 13.46\\ 13.95\\ 16.75\\ 10.61\\ \end{array}$	901 908	51 52 53 54 55 56 57 58 59 60	$15.39 \\ 17.04 \\ 16.43 \\ 16.78 \\ 15.94 \\ 14.75 \\ 14.18 \\ 13.87 \\ 15.00 \\ 15.73$	915 919 923	91 92 93 94 95 96 97 98 99 99 100	$\begin{array}{c} 15.83\\ 15.92\\ 14.83\\ 12.62\\ 14.38\\ 15.85\\ 16.52\\ 14.17\\ 13.22\\ 14.52\\ \end{array}$	903 917 910
			Ь	ly Dam	814			
			61 62 63 64 65 66 67 68	$15.74 \\ 16.28 \\ 13.62 \\ .16.50 \\ 15.72 \\ 13.90 \\ 14.60 \\ 15.62 $	912 920			
			69 70	16.13 [•] 16.33	925			-

TABLE 31.—PROTEIN IN ONE HUNDRED INDIVIDUAL EARS FROM HIGH-PROTEIN Plot of 1904

1908.]

[September,

Register	Register By Dam Protein, percent.				By Dam	Protein,	percent.
ear No.	No.	Seed ear planted.	Crophar- vested.	Register ear No.	No.	Seed ear planted.	Crophar- vested.
901 902 903 904 905 906 907 908 909 910 911 912 913	808 811 820 803 811 806 803 808 816 820 818 814 803	$\begin{array}{c} 16.49\\ 17.53\\ 15.83\\ 16.89\\ 17.38\\ 16.60\\ 16.41\\ 16.75\\ 16.24\\ 16.52\\ 15.97\\ 16.28\\ 17.00\\ \end{array}$	13.97	914 915 916 917 918 919 920 921 922 923 924 925	811 812 811 820 809 812 814 809 818 812 806 814	$\begin{array}{c} 17.73\\ 17.04\\ 17.79\\ 15.85\\ 16.57\\ 16.43\\ 16.50\\ 16.35\\ 16.76\\ 16.78\\ 16.77\\ 16.33\\ \end{array}$	15.09 14.75 14.91 14.76 14.86
	Average	of six sele	cted rows			16.77	14.72

TABLE 32.-NINTH GENERATION HIGH PROTEIN PLOT RECORD, 1905

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California and Califo								
Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
В	y Dam	912	B	y Dam	918	B	y Dam	922
1	13.84	•	41	14.65		81	15.43	
2	13.82		42	14.00		82	13.38	
3	15.30		43	15.83	1011	83	14.06	
4 5	12.77		- 44	14.71		84	16.16	1010
5	14.35		45	14.86		85	14.83	*
$\frac{6}{7}$	12.91		46	13.95		86	12.74	
	15.52	1007	47	14.51		87 /	15.25	•
8	15.84	1002	48	15.87	1023	88	15.30	1003
9	$13.39 \\ 13.82$		49	16.58	1006	89 90	$15.71 \\ 14.79$	1003
10 11	13.82		50 51	14.59 14.02		90 91	14.79	
11	12.98		52	14.02		92	14.89	
13	13.99		53	13.15		93	14.09	
14 .	15.81	1014	54	15.07		94	14.78	
15	15,22		55	14.29		95	12.84	
16	13.48		56	15.29		96	15.39	
17	14.70		57	16.10	1018	97	15.10	
18	10.77		58	15.36		98	13.87	
19 ·	15.62	1019	59	14.54		99	15.72	1022
20	13.99	0.	60	13.81		100	15.65	1015
В	y Dam	914	' B	y Dam	920	B	y Dam	924
21	16.00		61	15.41		101	14.75	
22	14.94		62	15.19		102	14.79	
23	14.25	1	63	16.87	1008	103	15.21	
24	16.32		64	12.44		104	15.56	
25	12.80		65	14.55		105 .	15.95	1012
26	17.35	1009	66	13.47		106	17.05	1024
27	14.95		67	15.46		107	15.05	
28	14.24		68	15.78	1001	108	15.88	1005
29	15.02		69	15.87	1001	109	12.00	
30	15.01		70	15.99	1020	110 111	15.38 11.03	
31 32	15.15		71 72	13.08 15.25		1112	14.60	
32 33	14.74 12.92		73	15.25	1013	112	15.74	1017
33	14.45		74	15.85	1015	113	16.59	1017
35	17.39	1004	75	13.99		115	14.02	
36	15.23	1001	76	14.71		116	15.44	
37	15.68	1016	77	14.36		117	14.97	
38	12.25		78	14.11		118	14.12	
39	17.30	1021	79	14.79		119	15.26	
40	15.74		80	15.28		120	13.90	
		1						

TABLE 33.—PROTEIN IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM HIGH-PROTEIN PLOT OF 1905

TABLE 34.-TENTH GENERATION HIGH PROTEIN PLOT RECORD, 1906

Register	By Dam	Protein,	percent	Register	By Dam	Protein,	percent.
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.	No.	Seed ear planted.	Crophar- vested.
$1001 \\ 1002 \\ 1003 \\ 1004 \\ 1005 \\ 1006 \\ 1007 \\ 1008 \\ 1009 \\ 1010 \\ 1011 \\ 1012$	920 912 922 914 924 918 912 920 914 922 918 924	$\begin{array}{c} 15.87\\ 15.84\\ 15.71\\ 17.39\\ 15.88\\ 16.58\\ 16.58\\ 15.52\\ 16.87\\ 17.35\\ 16.16\\ 15.83\\ 15.95 \end{array}$	14.35 14.50 14.35 13.92	$1013 \\ 1014 \\ 1015 \\ 1016 \\ 1017 \\ 1018 \\ 1019 \\ 1020 \\ 1021 \\ 1022 \\ 1023 \\ 1024$	920 912 922 914 924 918 912 920 914 922 918 924	$\begin{array}{c} 15.88\\ 15.81\\ 15.65\\ 15.68\\ 15.74\\ 16.10\\ 15.62\\ 15.99\\ 17.30\\ 15.72\\ 15.87\\ 17.05 \end{array}$	14.47 13.97
	Aver	age of six	selected i	ows		16.30	14.26

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TABLE	35.—PROTEIN	IN	ONE HUNDRED TWENTY	INDIVIDUAL	Ears	FROM	HIGH-
			PROTEIN PLOT OF I	1906			

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annval ear No.	Protein, percent.	Register No. assigned.
Bj	y Dam	1004	B	y Dam	1010	B	y Dam	1020
1 2 3 4 5 6 7 8	$17.13 \\ 15.56 \\ 16.62 \\ 14.57 \\ 13.83 \\ 11.73 \\ 15.02 \\ 14.07 \\ 12.90 \\ 14.07 \\ 12.90 \\ 14.07 \\ 12.90 \\ 14.07 \\ 14.0$	1102 1114	41 42 43 44 45 46 47 48 49	$14.17 \\ 13.94 \\ 11.84 \\ 14.00 \\ 13.14 \\ 14.75 \\ 14.42 \\ 14.37 \\ 12.50 \\ 14.50 \\ 12.50 \\ 14.17 \\ 12.50 \\ 14.17 \\ 12.50 \\ 14.17 \\ 12.50 \\ 14.17 \\ 12.50 \\ 14.17 \\ 12.50 \\ 14.17 \\ 12.50 \\ 14.17 \\ 14.1$		81 82 83 84 85 86 87 88 88	$16.11 \\ 14.36 \\ 12.64 \\ 14.27 \\ 15.57 \\ 15.00 \\ 14.62 \\ 12.57 \\ 12.60 \\ 14.62 \\ 12.57 \\ 12.60 \\ 14.60 \\ 12.57 \\ 12.5$	1110
9 10 11 12 13 14 15 16 17 18 19	13.89 13.85 13.02 13.88 15.76 13.98 12.69 12.04 14.87 15.79 14.14	1107 1119	49 50 51 52 53 54 55 56 57 58 59	$\begin{array}{c} 12.50\\ 14.96\\ 13.93\\ 15.69\\ 15.54\\ 15.16\\ 17.67\\ 14.91\\ 13.67\\ 13.50\\ 14.70\\ \end{array}$	1111 1106 1123 1118	89 90 91 • 92 93 94 95 96 97 97 98 99	$\begin{array}{c} 13.69\\ 14.15\\ 14.46\\ 14.12\\ 15.74\\ 15.63\\ 13.51\\ 14.19\\ 13.25\\ 14.79\\ 14.48 \end{array}$	1103 1115
20	14.56		60	14.16		100	16.17	1122
B_{j}^{*}	y Dam 1	7006	B	y Dam	1012		y Dam	1022
21 22 23 24 25 26	14.88 12.87 12.61 14.72 12.75 12.85		61 62 63 64 65 66	$14.17 \\ 15.58 \\ 14.85 \\ 11.09 \\ 14.21 \\ 13.59$	1113	$ \begin{array}{r} 101 \\ 102 \\ 103 \\ 104 \\ 105 \\ 106 \end{array} $	16.11 13.77 14.14 14.11 13.15 11.30	1105
27 28 29 30 31 32	16.30 15.44 15.01 15.26 13.37 16.06	1104 1109 1116	67 68 69 70 71 72	12.44 14.07 15.35 14.45 11.42 12.19	1101	107 108 109 110 111 112	12.91 15.82 16.48 10.46 14.79 14.36	1112 1124
33 34 35 36 37 38	$13.31 \\ 15.20 \\ 15.93 \\ 15.08 \\ 13.78 \\ 14.95$	1121	73 74 75 76 77 78	13.40 14.89 13.58 13.94 16.36 12.82	1120	113 114 115 116 117 118	$12.47 \\ 12.06 \\ 14.93 \\ 12.62 \\ 14.10 \\ 14.28$	
39 40	14.44 14.08	-	79 80	14.18 15.79	1108	119 120	15.65 15.78	1117

Register		Protein,	percent.	Register	By Dam	Protein,	percent.		
ear No.		Seed ear planted.	Crophar- vested.	ear No.	No.	Seed ear planted	Crephar- vested.		
101 102 103 104 105 *106		9.31 9.12 9.08 9.15 8.38 8.25	† 10.55 10 89 10.26 10 10 ↓10.73 ₹ 9.90	*107 108 109 110 111 112		8.40 9.22 9.33 9.36 9.30 • 9.47	$\begin{cases} 10.36\\ 10.20\\ 9.89\\ 10.24\\ 11.20\\ 12.24\\ \dagger \end{cases}$		
	Average of ten rows †8.9610.55								

TABLE 36.—FIRST GENERATION LOW PROTEIN PLOT RECORD, 1897

[†]Analyses of seed for rows that are not represented in the harvest are not included in the plot average.

*Crop from Reg. Nos. 106 and 107 were sampled in duplicate.

TABLE 37.—PROTEIN IN FORTY-EIGHT INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1897

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, perceat.	Register No. assigned	Annual ear No.	Protein, percent.	Register No. assigned.
. 1	By Dam	102	I	By Dam	106	L	By Dam	108
411 412 413 414	11.37 11.47 11.36 11.15		431 432 433 434	10.98 9.67 9.91 12.85	212	451 452 453 454	10.80 10.07 12.13 10.04	
	By Dam	103		By Dam	106		By Dam	109
416 417 418 419	8.88 9.26 11.62 10.43	208 203	436 437 438 439	9.38 10.03 10.97 9.28	211 210	456 457 458 459	$ \begin{array}{r} 10.16 \\ 10.22 \\ 8.22 \\ 11.92 \end{array} $	206
1	By Dam	104	L	By Dam	107	L	By Dam	110
421 422 423 424	9.60 9.93 12.45 10.43	201	441 442 443 444	10.25 10.28 11.40 9.34	202	461 462 463 464	11.61 10.85 10.04 11.68	
1	By Dam	105	*	By Dam	107	L E	By Dam	III
426 427 428 429	11.46 8.29 10.19 9.69	207	446 447 448 449	8.84 11.27 9.05 8.95	205 209 204	466 467 468 469	13.98 12.55 13.89 12.19	

*An extra set of ears were analyzed from Dams 106 and 107

TEN GENERATIONS OF CORN BREEDING.

Register	By Dam	Protein, percent.		Register	By Dam	Protein, percent.	
ear No.	No.	Seed ear Crophar- planted. vested.		ear No.	No.	Seed ear planted.	Crop har- vested.
201 202 203 204 205 *206	104 107 103 107 107 109	9.60 9.34 9.26 8.95 8.84 8.22	$10.92 \\ 11.00 \\ 11.03 \\ 10.06 \\ 9.83 \\ \{10.26 \\ 10.19 \end{cases}$	*207 208 209 210 211 212	105 103 107 106 106 106	8.29 8.88 9.05 9.28 9.38 9.67	<pre>{ 10.43 { 11.14 10.68 ·11.16 9.93 10.27 10.83</pre>
			9.06	10.55			

TABLE 38.—SECOND GENERATION LOW PROTEIN PLOT RECORD, 1898

*Crop from Reg. Nos. 206 and 207 were sampled in duplicate.

1908.]

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[September,

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.				
В	y Dam 2	IOI	1	By Dam	206	1	By Dam .	209				
1101 1102 1103 1104 1105 1106 1107	$9.26 \\10.25 \\10.73 \\7.76 \\12.78 \\11.36 \\10.17 \\12.40$	309	1151 1152 1153 1154 1155 1156 1157	$\begin{array}{r} 8.90 \\ 10.62 \\ 9.33 \\ 9.52 \\ 11.00 \\ 10.68 \\ 10.30 \\ 12.04 \end{array}$	315	$1201 \\ 1202 \\ 1203 \\ 1204 \\ 1205 \\ 1206 \\ 1207 \\ 1208 \\$	$12.70 \\ 11.02 \\ 10.97 \\ 10.89 \\ 10.25 \\ 12.31 \\ 11.35 \\ 0.81 \\ $					
1108 1109	12.49 11.98		1158 1159	$13.04 \\ 9.02$	301	1208 1209	9.81 9.60					
B	y Dam 2	202	*	By Dam	206		By Dam	210				
1111 1112 1113 1114 1115 1116 1117 1118 1119	9.99 11.07 11.26 11.09 10.40 11.11 11.33 10.70 11.41		$\begin{array}{c} 1161\\ 1162\\ 1163\\ 1164\\ 1165\\ 1166\\ 1167\\ 1168\\ 1169\\ \end{array}$	$10.93 \\ 10.58 \\ 10.24 \\ 9.41 \\ 7.85 \\ 11.71 \\ 8.29 \\ 11.65 \\ 9.90$	310 306	1211 1212 1213 1214 1215 1216 1217 1218 1219	$\begin{array}{c} 8.66\\ 9.87\\ 11.63\\ 9.45\\ 10.78\\ 9.99\\ 9.87\\ 10.22\\ 8.82 \end{array}$	303				
В	y Dam 2	203		By Dam .	207	•	By Dam .	211				
1121 [.] 1122 1123 1124 1125 1126 1127 1128 1129	$\begin{array}{c} 11.87\\ 9.57\\ 10.48\\ 10.28\\ 10.87\\ 13.36\\ 11.44\\ 9.45\\ 11.60\\ \end{array}$		1171 1172 1173 1174 1175 1176 1177 1178 1179	$10.10 \\ 10.71 \\ 8.63 \\ 10.34 \\ 11.32 \\ 10.93 \\ 11.66 \\ 9.66 \\ 11.10$	313	 1221 1222 1223 1224 1225 1226 1227 1228 1229 	$\begin{array}{c} 11.51\\ 11.28\\ 10.94\\ 10.63\\ 8.32\\ 10.16\\ 9.18\\ 8.78\\ 10.74 \end{array}$	311				
Б	ly Dam 2	204	*/	By Dam	207	1	By Dam 2	?12				
1131 1132 1133 1134 1135 1136 1137 1138 1139	$\begin{array}{c} 8.58 \\ 12.97 \\ 7.85 \\ 9.24 \\ 11.81 \\ 11.77 \\ 8.80 \\ 10.97 \\ 8.57 \end{array}$	312 307 305	$\begin{array}{c} 1181 \\ 1182 \\ 1183 \\ 1184 \\ 1185 \\ 1186 \\ 1187 \\ 1188 \\ 1189 \end{array}$	$16.08 \\ 12.30 \\ 13.25 \\ 8.95 \\ 11.36 \\ 9.46 \\ 11.42 \\ 8.83 \\ 10.19 \\$	316 302	1231 1232 1233 1234 1235 1236 1237 1238 1239	$10.44 \\ 11.27 \\ 10.30 \\ 12.46 \\ 9.52 \\ 10.02 \\ 11.34 \\ 10.54 \\ 10.09 \\ 10.09 \\ 10.01$	~				
Б	y Dam 2	205		By Dam	208							
1141 1142 1143 1144 1145 1146 1147 1148 1149	$10.58 \\ 11.21 \\ 10.21 \\ 7.50 \\ 9.67 \\ 9.56 \\ 9.54 \\ 10.15 \\ 8.62$	308	1191 1192 1193 1194 1195 1196 1197 1198 1199	$\begin{array}{r} 9.71 \\ 11.38 \\ 9.15 \\ 12.48 \\ 11.48 \\ 10.41 \\ 11.59 \\ 10.85 \\ 9.26 \end{array}$		•						
	8.62				1 from Da	206	nd 207					

. TABLE 39.-PROTEIN IN ONE HUNDRED TWENTY-SIX INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1898

*An extra set of ears were analyzed from Dams 206 and 207.

TEN GENERATIONS OF CORN BREEDING.

Register	By Dam		percent.	Register	By Dam	Protein,	percent.
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.	No.	Seed ear planted.	Crophar- vested.
301 302 303 304 305 306 307	206 207 210 205 204 206 204	9.02 8.83 8.66 8.62 8.57 8.29 7.85	$\begin{array}{r} 9.80 \\ 10.09 \\ 9.87 \\ 9.95 \\ 9.70 \\ 9.83 \\ 9.55 \end{array}$	309 310 311 312 313 314 315	201 206 211 204 207 210 206	7.76 7.85 8.32 8.58 8.63 8.82 8.90	$9.26 \\ 10.33 \\ 9.61 \\ 10.50 \\ 9.88 \\ 9.73 \\ 9.79 \\ 9.79$
308	205	7.50 Average of	9.53 f plot	316	207	8.95 8.45	10.40 9.86

TABLE 40.—THIRD GENERATION LOW PROTEIN PLOT RECORD, 1899

1908.]

[September,

	I KOLEIN I LOI OF 1099										
Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.			
· 1	By Dam	301	1	By Dam	306	E	By Dam	311			
1841	9.49		1891	8.54		1941	9.66				
1842	8.66		1892	9.13		1942	8.66				
1843	9.17		1893	8.68		1943	8.71				
1844	9.11		1894	8.47	409	1944	8.83				
1845 1846	8.97 11.49		1895 1896	6.66 9.40	408	1945 1946	9.11 10.15				
1840	9.56		1897	9.00		1940	9.29				
1848	9.74		1898	8.79		1948	9.86				
1849	9.72		1899	9.66		1949	9.54				
1	By Dam	302	1	By Dam	307	1	By Dam	312			
1851	10.16		1901	10.49		1951	9.84				
1852	8.82		1902	9.04		1952	10.57				
1853	9.26 10.07		1903	8.95		1953 1954	9.93 9.76				
1854 1855	11.29		1904 1905	9.89 9.92		1955	9.27				
1856	9.69	1	1906	10.91		1956	9.85				
1857	10.23		1907	10.04		1957	10.15				
1858	8.63	416	1908	10.24	101	1958	10.74				
1859	8.57	415	1909	8.08	404	1959	9.12	ł			
1	By Dam	303		By Dam	308		By Dam	313			
1861	9.48		1911	9.52		1961	9.62				
1862	10.23 10.77		1912	8.41 9.50		1962 1963	10.57 11.99				
1863 1864	9.74		1913 1914	9.30		1963	10.27				
1865	10.34		1915	8.39		1965	9.55				
1866	9.96		1916	9.26		1966	8.54	402			
1867	9.30		1917	8.62	401	1967	9.99				
$1868 \\ 1869$	9.01 10.38		1918 1919	9.18	406	1968 1969	10.19 13.06				
				*				1 			
1871	By Dam 9.27	304	1921	<i>3y Dam</i> 7.49		1971	3y Dam 9.66	314			
1871	8.70		1921	8.61	407	1971	8.44	403			
1873	10.54		1923	7.98	405	1973	8.85				
1874	9.20		1924	9.89		1974	9.72				
1875	9.44		1925	7.60	410	1975	10.28				
$1876 \\ 1877$	10.19 8.18	413	1926 1927	8.41 9.44		1976 1977	8.74				
1878	10.99	415	1928	9.42		1978	10.13				
1879			1929	8.67		1979	10.26				
1	By Dam	305	1	By Dam	310	L	By Dam	315			
1881	7.83	411	1931	11.62		1981	9.54				
1882	9.53		1932	10.12		1982	9.00				
1883 1884	10.98 7.61		1933 1934	10.15		1983 1984	9.06				
1885	9.84		1935	8.47	414	1985	9.05				
1886	9.52		1936	11.76		1986	8.95				
1887	8.94		1937	10.14		1987	8.03	412			
1888 1880	9.17		1938	9.59		1988	10.48				
1889	8.48		1939	11.86		1989	9.64				

 TABLE 41.—PROTEIN IN ONE HUNDED FORTY-FOUR INDIVIDUAL EARS FROM LOW

 PROTEIN PLOT OF 1899

TABLE 41.	(Continued.)
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n						
By	y Dam	316				
1991 :	10.33				•	
1992	10.46					
1993	9.34					
1994	9.96					
1995	10.70					
	10.09		•			~
	11.28					
	10.59					
1999 :	10.86				•	

TABLE 42.—FOURTH GENERATION LOW PROTEIN PLOT RECORD, 1900

Register	By Dam No.	Prótein,	percent.	Register	By Dam	Protein, percent.		
ear No.		Seed ear planted.	Crophar- vested.		No.	Seed ear planted.	Crophar- vested.	
401 402 403 404 405 406 407 408	308 313 314 307 309 308 309 306	8.62 8.54 8.44 8.08 7.98 7.74 7.49 6.66	$9.14 \\ 9.54 \\ 9.20 \\ 9.09 \\ 9.04 \\ 9.08 \\ 9.35 \\ 8.84$	409 410 411 412 413 414 415 416	306 309 305 315 304 310 302 302	$\begin{array}{r} 8.47 \\ 7.60 \\ 7.83 \\ 8.03 \\ 8.18 \\ 8.47 \\ 8.57 \\ 8.63 \end{array}$	9.03 9.08 9.97 9.39 9.09 9.41 9.53 10.72	
		8.08	9.34					

[September,

Annual ear No	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
By Dam 401			By Dam 406			B Dam 411		
				-	7			
3041 3042	9.82 9.08		3091 3092	8.50 8.37		3141 3142	7.54 8.15	510
3042	9.08		3092	9.28		3142	10.02	
3043	9.58		3093	9.28		3143	10.02	
- 3045	7.96		3094	8.30		3145	8.87	
3045	7.62	511	3095	7.91		3146	9.54	
3040	8.61	511	3097	10.26		3140	11.32	
3048	9.36		3098	7.67	503	3148	10.73	
3049	8.55		3099	8.25	505	3149	12.29	
	By Dam	402		By Dam	407		By Dam	412
3051	8.44		3101	8.27		3151 3152	10.76	
3052 3053	8.90		3102 3103	8.39 11.85		3152	$11.16 \\ 11.12$	
3053	9.67		3103	8.57		3155	10.12	
3054	7.90	514	3105 ·	9.13		3154	7.78	513
3055	8.95	514	3105	10.13		3155	8.69	515
3057	10.90		3107	8.52		3157	9.14	
3058	8.34		3107	7.79	501	3158	10.05	
3059	10.23		3109	9.81	501	3159	9.34	
Ì	By Dam	403	By Dam 408			By Dam 413		
3061	8.40	`	3111	7.90		3161	9.39	
3062	9.04		3112	8.57		3162	9.85	
3063	7.50	505	3113	8.04		3163	8.14	
3064	8.60		3114	8.18		3164	8.74	
3065	9.95		3115	7.26	508	3165	9.21	
3066	7.43	506	3116	9.79		3166	8.54	
3067	9.71		3117	8.14		3167	9.54	
3068	10.19		3118	11.83		3168	8.87	
3069	7.67	1	3119	8.67	1	3169	9.72	
	By Dam			By Dam	409	1	By Dam	414
3071	7.75	502	3121	9.58		3171	8.14	
3072	9.08		3122	8.12		3172	10.12	
3073	10.53		3123	8.93		3173	8.68	
3074	8.09		3124	8.02		3174	8.86	
3075	9.81		3125	8.46		3175 3176	9.28	
3076	9.32		3126 3127	9.33		3177	8.16	
3077 3078	7.08	507	3127	9.50		3178	8.81	
3078	10.08	507	3120		1	3179	8.70	
	By Dam 405 By Dam 410 3081 7.49 509 3131 8.72		By Dam 415 3181 8.40					
	7.49	509				3181	10.89	
3082	9.53			8.49	512	3182	10.89	
3083 3084	8.56		3133 3134	9.66		3183	9.85	
3084	8.40		3134	9.00		3185	9.85	
3085	9.77		3135	9.18		3186	8.55	
3087	9.67		3130	8.17		3180	9.03	
3087	10.47		3138	10.31		3188	8.92	
3089	9.99		3139	7.56	504	3189	9.94	
	1 2.25		0105	1	00.	0.00		

TABLE 43.—PROTEIN IN ONE HUNDRED FORTY-FOUR INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1900

TEN GENERATIONS OF CORN BREEDING.

Annual ear No.	Protein percent.	Register No. assigned.
1	By Dam	416
3191	10.51	
3192 3193	9.52 9.52	
3194	9.93	
3195 3196	8.58 10.74	
3190	10.74	
3198	9.86	
3199	9.41	

TABLE 43.—Continued

TABLE 44.-FIFTH GENERATION LOW PROTEIN PLOT RECORD 1901

Register ear No.	By Dam		percent.	Register	By Dam	Protein, percent.	
	No.	Seed ear planted.	Crophar- vested.		No.	Seed ear planted.	Crophar- vested.
501 502 503 504 505 506 507	407 404 406 410 403 403 403 404	7.797.757.677.567.507.437.08	$10.30 \\ 9.50 \\ 9.69 \\ 9.97 \\ 9.59 \\ 10.08 \\ 10.54$	508 509 510 511 512 513 514	408 405 411 401 410 412 402	7.26 7.49 7.54 7.62 7.70 7.78 7.90	9.92 10.90 9.38 10.68 10.44 9.61 9.97
		7.58	10.04				

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	FROIEIN FLOT OF 1901											
Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.				
В	y Dam y	or l	1	By Dam	506	1	By Dam	511				
3751 3752 3753 3754 3755 3756 3756 3757 3758 3759	9.79 9.85 11.03 9.17 10.22 10.32 10.12 9.01 8.89		3801 3802 3803 3804 3805 3806 3807 3808 3809	9.56 10.30 9.03 8.36 9.61 9.80 9.78 8.36 9.77	602 613	3851 3852 3853 3854 3855 3856 3857 3858 3859	9.24 10.25 12.82 10.93 9.73 9.98 10.78 9.91 8.22					
В	y Dam 5	02	1	By Dam	507	1	By Dam	512				
3761 3762 3763 3764 3765 3766 3766 3767 3768 3769	$\begin{array}{r} 8.37 \\ 7.77 \\ 9.08 \\ 8.14 \\ 8.44 \\ 10.37 \\ 8.43 \\ 11.63 \\ 11.11 \end{array}$	614 609 610	3811 3812 3813 3814 3815 3816 3817 3818 3819	$10.26 \\ 9.03 \\ 9.70 \\ 11.22 \\ 11.39 \\ 9.27 \\ 8.92 \\ 10.50 \\ 10.52 \\ $		3861 3862 3863 3864 3865 3866 3867 3868 3869	$\begin{array}{c} 8.61 \\ 8.72 \\ 8.93 \\ 10.03 \\ 9.35 \\ 8.78 \\ 9.75 \\ 12.47 \\ 10.79 \end{array}$	-				
	y Dam 3	503		By Dam	508		By Dam	513 .				
3771 3772 3773 3774 3775 3776 3776 3777 3778 3779	8.20 9.33 9.44 10.03 8.41 9.52 10.51 9.88 9.60	611 601	3821 3822 3823 3824 3825 3826 3827 3828 3829	$\begin{array}{c} 8.83\\ 10.29\\ 10.05\\ 9.11\\ 10.24\\ 9.05\\ 9.68\\ 9.08\\ 9.66\\ \end{array}$	- -	3871 3872 3873 3874 3875 3876 3876 3877 3878 3879	9.40 8.71 7.54 9.06 9.05 10.84 8.87 9.53 9.79	607				
В	y Dam	504	1	By Dam	509	- 1	By Dam	514				
3781 3782 3783 3784 3785 3786 3786 3787 3788 3788 3789	8.41 9.18 11.38 8.49 10.83 8.68 8.49 10.72 11.18		3831 3832 3833 3834 3835 3836 3837 3838 3839	$\begin{array}{c} 9.83\\ 13.05\\ 11.44\\ 10.54\\ 9.57\\ 10.23\\ 12.02\\ 9.23\\ 11.59\\ \end{array}$		3881 3882 3883 3884 3885 3886 3887 3888 3889	$\begin{array}{c} 9.61 \\ 7.66 \\ 9.60 \\ 11.75 \\ 8.03 \\ 8.25 \\ 11.34 \\ 8.53 \\ 10.97 \end{array}$	606 605 603				
В	y Dam	505		By Dam	510							
3791 3792 3793 3794 3795 3796 3797 3798	9.45 9.16 10.19 8.19 10.41 8.53 8.34	612	3841 3842 3843 3844 3845 3845 3846 3847 2848	8.73 7.59 8.53 10.26 9.20 8.19 9.52 8.73	608 604							
3798 3799	9.08 10.39	•	3848 3849	8.73 8.81								

TABLE 45 .- PROTEIN IN ONE HUNDRED TWENTY-SIX INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1901

Register	By Dam	Protein, percent.		Register	By Dam	Protein,	Protein, percent.	
ear No.	No.	Seed ear planted.	Crophar- vested.		No.	Seed ear planted.	Crophar- vested.	
601 602 603 604 605 606 607	503 506 514 510 514 514 514 513	8.418.368.258.198.037.667.54	8.03 7.78 7.63 8.47 8.43	608 609 610 611 612 613 614	510 502 502 503 505 506 -502	7.597.778.148.208.348.368.37	8.01 8.53 8.29 8.47 8.57	
	Averag	8.15	8.22					

TABLE 46.—SIXTH GENERATION LOW PROTEIN PLOT RECORD 1902

TABLE 47.—PROTEIN IN NINETY INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1902

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
E	By Dam	601	I	By Dam	605	B	y Dam	612
4271 4272 4273 4274 4275 4276 4277 4278 4279	7.66 9.05 7.89 8.63 7.74 6.98 7.78 9.69 7.46	707	4301 4302 4303 4304 4305 4306 4307 4308 4309	7.96 9.38 8.04 8.41 7.53 8.20 7.63 7.65 7.57	-	4341 4342 4343 4344 4345 4346 4347 4348 4349	$\begin{array}{c} 7.57\\ 8.15\\ 8.11\\ 7.73\\ 8.70\\ 6.84\\ 7.94\\ 7.94\\ 8.10\end{array}$	708
	y Dam		1	ly Dam	606 _	B		513
4281 4282 4283 4284 4285 4286 4287 4288 4289 4299 4293 4294 4295 4296 4297 4298 4299	6.61 8.89 8.31 8.52 7.46 6.86 6.37 7.59 7.50 <i>Dam</i> 7.47 7.36 7.97 7.97 7.97 6.45 7.29 7.52 7.24 7.12	714 - 715 712 603 - 702 713 720 719 719 705	4311 4312 4313 4314 4315 4316 4317 4318 4319 4321 4322 4323 4324 4325 4326 4327 4328 4329	9.44 8.31 7.01 7.65 7.43 8.47 8.03 7.62 8.27 8.27 8.27 8.27 7.09 6.42 7.22 9.14 7.42 7.00 9.53 6.37 8.20	706 701 608 717 710 718 721 716 711	4351 4352 4353 4354 4355 4356 4357 4358 4359 <i>B</i> 4361 4362 4363 4364 4365 4366 4366 4366 4366	7.52 8.17 7.80 7.47 7.59 9.12 8.63 9.48 7.23 <i>y Dam 6</i> 8.38 7.94 8.46 7.62 8.63 8.51 7.45 6.48 8.21	704 514 722 709
4200	1 1.12	100		By Dam	610	1305	0.21	
			4331 4332 4333 4334 4335 4336 4337 4338 4339	$\begin{array}{c} 8.38\\ 8.44\\ 7.73\\ 8.10\\ 7.67\\ 7.78\\ 7.27\\ 7.70\\ 7.85\end{array}$	703			

[September,

Register	By Dam	Protein,	percent.	Register	By Dam	Protein,	tein, percent.	
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.	No.	Seed ear planted.	Crophar- vested.	
701 702 703 704 705 706 706 707 708 709 710 711	$\begin{array}{c} 606\\ 603\\ 610\\ 613\\ 603\\ 606\\ 601\\ 612\\ 614\\ 608\\ 608\\ 608\\ \end{array}$	$\begin{array}{c} 7.43 \\ 7.36 \\ 7.27 \\ 7.23 \\ 7.12 \\ 7.01 \\ 6.98 \\ 6.84 \\ 6.48 \\ 6.42 \\ 6.37 \end{array}$	8.57 9.04 7.68 8.53 9.22 8.88 8.63 8.51	712 713 714 715 716 717 718 719 720 721 722	602 603 602 608 608 608 603 603 603 603 603 604	$\begin{array}{c} 6.37\\ 6.45\\ 6.61\\ 6.86\\ 7.00\\ 7.09\\ 7.22\\ 7.24\\ 7.29\\ 7.42\\ 7.45\\ \end{array}$	8.41 8.74	
	Averag	6.93	8.62					

TABLE 48.—SEVENTH GENERATION LOW PROTEIN PLOT RECORD 1903

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
В	ly Dam	702	E	By Dam	706	B	y Dam ;	711
1 2 3 4 5 6 7 8 9 10	$\begin{array}{c} 8.58 \\ 8.40 \\ 8.56 \\ 6.82 \\ 8.41 \\ 7.14 \\ 8.37 \\ 8.43 \\ 6.89 \\ 7.26 \end{array}$	815 805 816 819	31 32 33 34 35 36 37 38 39 40	$\begin{array}{c} 7.73 \\ 7.43 \\ 8.69 \\ 6.67 \\ 7.20 \\ 7.56 \\ 8.95 \\ 7.41 \\ 8.01 \\ 8.03 \end{array}$		71 72 73 74 75 76 77 78 79 80	$\begin{array}{c} 7.17\\ 8.41\\ 8.10\\ 7.77\\ 7.92\\ 7.28\\ 6.80\\ 8.01\\ 6.79\\ 9.50\end{array}$	803 814 809
	By Dam	703		By Dam	707		y Dam	715
11 12 13 14 15 16	9.14 8.86 8.20 7.85 9.26 9.48		41 42 43 44 45 46	$\begin{array}{r} 8.26 \\ 7.34 \\ 7.37 \\ 6.75 \\ 10.20 \\ 9.05 \end{array}$	801 813	81 82 83 84 85 86	7.957.3010.057.418.147.74	820
17 18 19 20	8.21 8.43 8.00 7.36	822	47 48 49 50	9.35 9.34 7.80 8.82		87 88 89 90	9.00 7.23 7.37 6.38	804 811
Ŀ	By Dam	704	L	By Dam	708	B	y Dam	716
21 22 23 24 25 26 27 28 29 30	$\begin{array}{c} 7.00 \\ 6.80 \\ 7.19 \\ 6.62 \\ 7.32 \\ 6.99 \\ 8.85 \\ 7.35 \\ 7.74 \\ 7.31 \end{array}$	817 808 818 810 821 806 802	51 52 53 54 55 56 57 58 59 60	$\begin{array}{c} 6.54 \\ 8.55 \\ 8.61 \\ 8.21 \\ 8.61 \\ 8.10 \\ 8.16 \\ 9.08 \\ 8.19 \\ 9.42 \end{array}$	812	91 92 93 94 95 96 97 98 99 100	8.13 8.37 8.60 8.57 8.61 7.86 7.87 8.61 6.87 7.95	807
				By Dam	710			
			61 62 63 64 65 66 67 68 69 70	$\begin{array}{c} 7.61 \\ 9.27 \\ 7.56 \\ 7.64 \\ 8.34 \\ 7.61 \\ 7.72 \\ 8.37 \\ 10.05 \\ 8.00 \end{array}$				

TABLE 49.-PROTEIN IN ONE HUNDRED INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1903 1 _____

[September,

Register	By Dam	Protein,	percent.	Register	By Dam	Protein, percent.			
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.	No.	Seed ear planted.	Crophar- vested.		
801 802 803 804 805 806 807 808 809 810 811	$707 \\ 704 \\ 711 \\ 715 \\ 702 \\ 704 \\ 716 \\ 704 \\ 711 \\ 704 \\ 715 \\$	$\begin{array}{c} 7.34 \\ 7.31 \\ 7.28 \\ 7.23 \\ 7.14 \\ 6.99 \\ 6.87 \\ 6.80 \\ 6.79 \\ 6.62 \\ 6.38 \end{array}$	9.42 8.76 8.81 8.66 9.36 10.09	812 813 814 815 816 817 818 819 820 821 822	708 707 711 702 702 704 704 704 702 715 704 703	$\begin{array}{c} 6.54\\ 6.75\\ 6.80\\ 6.82\\ 6.89\\ 7.00\\ 7.19\\ 7.26\\ 7.30\\ 7.32\\ 7.36\end{array}$	9.56 9.02 9.27 9.79		
Average of ten selected rows 7.00 9.27									

TABLE 50.—EIGHTH GENERATION LOW PROTEIN PLOT RECORD 1904

			P					
Annual ear No.	Protein, percent	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
B	Ry Dam	802	L	By Dam	807	B	y Dam	815
1 2 3 4 5 6 7 8 9 10	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	902 911	31 32 33 34 35 36 37 38 39 40	$\left \begin{array}{c}9.00\\7.80\\7.95\\8.44\\8.64\\8.21\\7.31\\8.51\\6.36\\8.22\end{array}\right $	903 909 916	71 72 73 74 75 76 77 78 79 80	$\begin{array}{c} 8.13\\ 8.30\\ 7.39\\ 7.15\\ 7.57\\ 7.63\\ 7.26\\ 7.87\\ 8.93\\ 6.57\\ \end{array}$	918 925 904
Ŀ	Ry Dam	803	l	By Dam	809	B	y Dam &	818
11 12 13 14 15 16 17 18 19 20	$\begin{array}{c} 8.94 \\ 6.13 \\ 7.24 \\ 7.69 \\ 8.67 \\ 8.55 \\ 6.78 \\ 7.38 \\ 7.24 \\ 7.64 \end{array}$	908 914 901	41 42 43 44 45 46 47 48 49 50	8.68 9.24 9.60 7.87 7.58 7.67 7.65 7.49 8.71 8.00	⁻⁹⁰⁷ 913 920	81 82 83 84 85 86 87 88 89 90	$\begin{array}{c} 7.86\\ 8.75\\ 7.76\\ 8.34\\ 9.26\\ 7.35\\ 7.70\\ 8.85\\ 7.53\end{array}$	921 910
В	y Dam	804	. I	By Dam	810	B	y Dam	821
21 22 23 24 25 26 27 28 29 30	$\begin{array}{c} 8.44 \\ 7.16 \\ 7.06 \\ 8.44 \\ 8.71 \\ 8.18 \\ 7.64 \\ 6.71 \\ 9.25 \\ 7.74 \end{array}$	923 912 906	51 52 53 54 55 56 57 58 59 60	$\begin{array}{c} 8.58\\ 9.98\\ 8.87\\ 7.89\\ 7.34\\ 8.06\\ 8.89\\ 8.55\\ 10.46\\ 7.79\end{array}$	905	91 92 93 94 95 96 97 - 98 99 100		919 924 915
			E	By Dam	812			
			61 62 63 64 65 66 67 68 69 70	$\begin{array}{c} 9.90\\ 8.05\\ 8.19\\ 7.88\\ 8.77\\ 9.47\\ 8.63\\ 7.51\\ 8.93\\ 8.25\\ \end{array}$	917			

TABLE 51 .- PROTEIN IN ONE HUNDRED INDIVIDUAL EARS FROM LOW-PROTEIN PLOT OF 1904

[September,

Register	By Dam	Protein,	percent.	Register	By Dam	Protein,	percent.
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.	No.	Seed ear planted.	Crophar- vested.
901 902 903 904 905 906 907 908 909 910 911 912 913	803 802 807 815 810 804 809 803 807 818 802 804 809	7.24 7.60 7.80 6.57 7.34 6.71 7.67 6.13 7.95 7.53 7.24 7.06 7.65	7.96 8.78 8.68	914 915 916 917 918 919 920 921 922 923 924 925	803 821 807 812 815 821 809 818 810 804 821 815	6.78 7.27 7.31 7.51 7.15 7.34 7.49 7.35 7.79 7.16 6.91 7.26	8.91 8.38 8.71
	Ave	7.09	8.57				

TABLE 52.-NINTH GENERATION LOW PROTEIN PLOT RECORD, 1905

TABLE	53.—PROTEIN	IN	One	HUNDRED	TWENTY	INDIVIDUAL	EARS	FROM	Low-
				PROTEIN F	LOT OF I	905			

Annual ear No.	Proteiu, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	. Register 'No. assigned	Annual ear No.	Protein, percent.	Register No. assigned.
1	By Dam	902	L	By Dam	912	L	By Dam	920
1	7.57		41	8.75		81	6.78	1010
2 3	6.86 7.61	1007	42 43	$10.80 \\ 7.92$		82 83	8.09 7.93	
3 4	7.88		43	9.97		84	7.47	
4 5 6	6.62	1002	45	8.60		85	9.38	
6	9.06		46	9.57		86	9.52	
7	8.02		47	9.36	1005	87	10.01	
8 9	8.02		48 49	7.24 8.38	1006	88 89	$9.48 \\ 7.28$	1003
10	7.87		50	8.20		90	7.86	1003
11	7.70		51	8.14		91	6.72	1022
12	9.57		52	9.14		92	7.08	1015
13	8.47		53	6.96	1018	93	8.04	
14 15	9.01 7.39	1019	54 55	8.61 9.83		94 95	$10.45 \\ 7.46$	
16	6.69	1019	55	8.13	1011	96	7.52	
17	8.59	TOTI	57	7.76	1023	97	10.04	
18	8.07		58	8.33	_	98	8.18	
19	8.36		59	8.38		99	8.71	
20	8.16		60	9.48		100	9.69	
	By Dam	906	1	By Dam	914		By Dam	924
21	9.69		61	9.09		101	9.80	1010
22 23	8.32 9.05		62 63	12.14	1001	102 103	$7.50 \\ 11.39$	1012
23	9.62		64	8.12	1001	103	7.58	1005
25	9.09	•	65	8.58		105	7.88	2000
26	9.23		66	8.15	1013	106	10.06	
27	8.53		67	9.28	1000	107	7.90	
28 29	9.57	1004	68 69	7.21 8.35	1008	108 109	9.40 9.32	
30	8.54	1004	70	8.55		109	$\frac{9.32}{7.38}$	1024
31	8.30		71	11.43		111	9.20	
32	8.24	1009	72	9.46		112	7.67	1017
33	8.88		73	7.38	1020	113	9.36	
34 35	9.28	1001	74	10.00		114 115	7.81	
35 36	8.18 9.20	1021	75 76	9.54 9.13		115	$\frac{8.20}{7.68}$	
37	9.57		77	7.90		117	9.05	
38	8.11	1016	78	8.76		118	8.28	
39	7.62		79	9.20		119	9.68	
40	9.81		80	8.53		120	9.05	

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Register	By Dam	Protein,	percent.	Register	By Dam	Protein,	percent.
ear No.	No.	Seed ear planted.	Crophar. vested.	· · · ·	No.	Seed ear planted.	Crophar- vested.
1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012	914 902 920 906 924 912 902 914 906 920 912 924	$\begin{array}{c} 7.47\\ 6.62\\ 7.28\\ 6.72\\ 7.58\\ 7.24\\ 6.86\\ 7.21\\ 8.24\\ 6.78\\ 8.13\\ 7.50\\ \end{array}$	9.01 8.43 8.71	1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024	914 902 920 906 924 912 902 914 906 920 912 924	$\begin{array}{c} 8.15\\ 6.69\\ 7.08\\ 8.11\\ 7.67\\ 6.96\\ 7.39\\ 7.38\\ 8.18\\ 6.72\\ 7.76\\ 7.38\end{array}$	8.25 8.70 8.76
	Aver	7.21	8.64				

TABLE 54.-TENTH GENERATION LOW PROTEIN PLOT RECORD, 1906

TEN GENERATIONS OF CORN BREEDING.

Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.	Annual ear No.	Protein, percent.	Register No. assigned.
·B	y Dam	1006	B	y Dam	1012	By	Dam 1	016
1	10.54		41	8.12		81	7.99	
2	8.80		42	9.02		82	8.19	
3	7.52	1107	43 44	9.83 8.08		83 84	7.54	1110 1103
÷	10.38		45	9.48	•	85	7.36	1103
3 4 5 6 7 8	7.61	1119	46	8.88		86	8.92	1122
7	9.46		47	7.92	1106	87	8.14	0.0
	9.38		48	9.48		88	9.63	
9	10.17		49 50	8.15 8.53		89 90	10.91	
10 11	9.23 9.00		50	8.87		90 91	9.78 7.93	
12	8.70		52	8.05	1111	92	9.07	
13	9.25		53	8.71		93	7.65	1115
14 -	9.17		54	8.18		94	9.83	
15	7.94		55	7.86	1118	95	8.97	
16 17	8.98 8.88	-	56 57	9.60 7.97	1123	96 97	8.78 9.06	
18	7.51	1102	58	9.35	1123	98	9.00	
19	10.45	1102	59	8:65		99	7.91	
20	6.94	1114	60	9.49		100	9.67	
B	y Dam .	1010	B	y Dam	1014	B	Dam 1	018
21	8.85	1	61	8.19		101	7.68	- 1112
22	7.64		62	7.07	1108	102	9.29	
23	9.87		63	8.54		103	8.36	
24 25	10.17 8.43		64 65	7.75		104 105	9.70 9.21	
25 26	7.39		66	9.36		105	8.67	
27	9.52		67	9.26		107	9.51	
28	8.70		68	7.67	-	108	9.29	
29	6.73	1104	69	9.17		109	9.43	
30	8.13		70 71	7.47		110 111	8.93	1105
31 32	9.92 9.71		71	9.54	1120	111	8.49	1105
33	7.02	1116	73	7.41	1101	113	8.88	
34	7.96		74	8.04 .		114	9.36	
35	7.36	1109	75	.10.63		115	7.04	1124
36	8.18		76	7.27	1113	116	8.88	
37 38	8.81 8.53		77 78	8.14 8.15		117 118	9.42 8.05	1117
39	7.36	1121	79	7.57		110	9.07	1117
40	8.32		80	8.80		120	8.15	

TABLE 55.—PROTEIN IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM LOW-PRO-TEIN PLOT OF 1906

[September,

.

Register	By Dam	Oil, pe	rcent.	Register	By Dam	Oil, pe	rcent.
ear No.	No.	Seed ear planted.	Crophar. vested.	ear No	No.		Crophar- vested.
101 102 103 104 105 106 107 108 109 110 111 112		$\begin{array}{c} 5.02\\ 5.09\\ 5.10\\ 5.23\\ 5.22\\ 5.22\\ 5.22\\ 5.24\\ 5.46\\ 5.51\\ 5.63\\ 5.65\\ 6.02\\ \end{array}$	4.43 4.74 4.77 4.65 4.50 4.53 4.98 4.75 5.40 4.65	$113 \\ 114 \\ 115 \\ 116 \\ 117 \\ 118 \\ 119 \\ 120 \\ 121 \\ 122 \\ 123 \\ 124$		5.75 5.61 5.36 5.25 5.23 5.27 5.21 5.20 5.13 5.02 4.99	4.99 4.84 5.23 4.70 4.47 4.81 4.38 4.80 4.58 4.46
	Avera	5.39	4.73				

TABLE 56.—FIRST GENERATION HIGH OIL PLOT RECORD, 1897

TABLE 57 .- OIL IN EIGHTY INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1897

Annual ear No.	Oil percent.	Register No. assigned.	Annual ear No.	Oil percent.	Register No. assigned.	Annual ear No.	Oil percent.	Register No. assigned.
Bj	v Dam	103	E	y Dam	110	B	y Dam	116
471 472 473 474	4.44 4.79 4.42 4.59		506 507 508 509	4.91 4.69 5.04 4.20	221	536 537 538 539	4.97 4.50 4.92 4.83	223
Bj	Dam	104	B	y Dam	III	B	y Dam .	117
476 477 478 479	4.84 4.82 5.39 4.40	209	511 512 513 514	5.44 5.45 5.49 5.39	210 214 213 216	541 542 543 544	4.78 3.60 4.91 5.02	220
B_y	, Dam	105	Б	y Dam	112	B	Dam .	18
481 482 483 484	5.04 4.87 4.46 5.07	219	516 517 518 519	4.63 5.26 4.81 4.44	217	546 547 548 549	5.20 5.00 4.90 4.81	207 222
By	Dam	106	В	y Dam	113	B	y Dam	119
488	5.03 4.20 4.72 4.86	203	521 522 523 524	4.98 4.22 4.91 5.68	201 212	551 552 553 554	4.31 4.33 4.24 4.33	
B_{j}	Dam	107 .	B	y Dam	114	B	y Dam	120
491 492 493 494	4.85 4.38 4.93 4.97	224	526 527 528 529	4.70 5.43 5.12 4.68	215 206	556 557 558 559	4.93 4.68 4.92 5.12	218
Bj	v Dam	108	E	By Dam	115	B	y Dam	121
496 497 498 499	4·26 4.59 4.76 4.45		531 532 533 534	5.04 4.82 4.98 5.27	204 202 208	561 562 563 564	4.41 4.62 4.95 4.23	
Bj	y Dam	109				B	y Dam .	122
501 502 503 504	5.45 4.95 4.64 4.77	211	•			566 567 568 569	4.39 4.20 5.05 4.42	205

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Register	By Dam	Oil, p	ercent.	Register	By Dam	Oil, p	ercent.
ear No.	No.	Seed ear planted.	Crophar. ear No.		No.	Seed ear planted.	Crophar- vested.
201 202 203 204 205 206 207 208 209 210 211 212	113 115 106 115 122 114 118 115 104 111 109 113	$\begin{array}{c} 4.98\\ 4.98\\ 5.03\\ 5.04\\ 5.05\\ 5.12\\ 5.20\\ 5.27\\ 5.39\\ 5.44\\ 5.45\\ 5.68\end{array}$	$\begin{array}{c} 4.86\\ 4.74\\ 4.94\\ 5.17\\ 5.36\\ 4.79\\ 4.87\\ 5.20\\ 5.16\\ 5.25\\ 5.63\\ .\end{array}$	213 214 215 216 217 218 219 220 221 222 223 224	111 111 114 111 112 120 105 117 110 118 116 107	5.49 5.45 5.43 5.26 5.12 5.07 5.02 5.04 5.00 4.97 4.97	5.21 5.44 5.48 5.26 5.55 5.23 5.06 4.89 5.00 5.10 5.05 5.21
	(5.20	5.15				

TABLE 58.—SECOND GENERATION HIGH OIL PLOT RECORD 1898

TEN GENERATIONS OF CORN BREEDING.

1					-			
Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
I	By Dam	201	1	By Dam	206	1	By Dam	211
1241 1242 1243 1244 1245 1246	5.14 5.47 4.44 4.66 4.30		1291 1292 1293 1294 1295	5.29 4.43 5.57 4.54 4.57		1341 1342 1343 1344 1345	4.79 5.90 4.68 5.33 5.70	302
1240 1247 1248 1249	4.38 4.94 4.76 4.62		1296 1297 1298 1299	$\begin{array}{r} 4.52 \\ 4.52 \\ 5.04 \\ 4.39 \end{array}$	•	1346 1347 1348 1349	4.80 5.09 5.08 5.31	
Ь	ly Dam	202	L	By Dam	207	Ŀ	ly Dam	212
1251 1252 1253 1254 1255 1256 1257 1258 1259	$\begin{array}{c} 4.11 \\ 5.16 \\ 4.53 \\ 4.39 \\ 4.73 \\ 4.79 \\ 4.16 \\ 4.47 \\ 5.82 \end{array}$	312	1301 1302 1303 1304 1305 1306 1307 1308 1309	4.58 4.37 4.93 4.21 5.59 4.83 4.84 6.09 4.91	309	1351 1352 1353 1354 1355 1356 1357 1358 1359	5.94 6.71 5.73 6.49 5.78 5.11 5.33 4.90 5.76	306 307
В	y Dam	203	Ŀ	By Dam	208	E	By Dam	213
$\begin{array}{c} 1261 \\ 1262 \\ 1263 \\ 1264 \\ 1265 \\ 1266 \\ 1267 \\ 1268 \\ 1269 \end{array}$	4.37 4.52 4.84 5.10 5.00 5.24 5.29 4.99 4.99		1311 1312 1313 1314 1315 1316 1317 1318 1319	$\begin{array}{c} 4.77 \\ 4.82 \\ 5.09 \\ 6.28 \\ 5.32 \\ 4.90 \\ 5.27 \\ 4.57 \\ 5.72 \end{array}$	304	1361 1362 1363 1364 1365 1366 1367 1368 1369	4.72 5.39 5.78 4.79 5.23 5.51 5.09 5.59 5.14	÷
В	y Dam	204	В	y Dam	209	E	By Dam	214
1271 1272 1273 1274 1275 1276 1277 1278 1279	$\begin{array}{c} 4.42 \\ 5.80 \\ 4.99 \\ 5.51 \\ 4.26 \\ 5.90 \\ 4.80 \\ 4.87 \\ 5.02 \end{array}$	310	1321 1322 1323 1324 1325 1326 1327 1328 1329	5.43 4.75 5.55 5.18 5.64 4.97 5.22 4.84 4.68		1371 1372 1373 1374 1375 1376 1377 1378 1379	5.07 5.12 5.09 5.43 5.55 5.55 5.14 5.77 5.89	311
B	y Dam	205	Ь	By Dam	210	E	By Dam	215
$\begin{array}{c c c} 1281 \\ 1282 \\ 1283 \\ 1284 \\ 1285 \\ 1286 \\ 1287 \\ 1288 \\ 1289 \\ \end{array}$	$5.21 \\ 5.87 \\ 5.23 \\ 5.44 \\ 4.50 \\ 5.21 \\ 4.85 \\ 5.18 \\ 5.26 \\ $		1331 1332 1333 1334 1335 1336 1337 1338 1339	5.05 4.73 5.02 5.55 4.59 5.68 5.54 6.08 5.00	303	$\begin{array}{c} 1381 \\ 1382 \\ 1383 \\ 1384 \\ 1385 \\ 1386 \\ 1387 \\ 1388 \\ 1389 \end{array}$	$5.29 \\ 4.70 \\ 5.00 \\ 5.69 \\ 5.81 \\ 5.77 \\ 5.07 \\ 5.06 \\ 6.47 \\$	305

TABLE 59.—OIL IN TWO HUNDRED SIXTEEN INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1898

1908.]

[September,

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	
Ŀ	By Dam	216	E	By Dam	219	By Dam 222			
1391	5.55		1421	4.87		1451	4.44		
1392	4.98		1422	5.05		1452	4.66		
1393	5.23		1423	4.54		1453	4.94		
1394	5.29		1424	4.99		1454	4.99		
1395	4.65		1425	4.97	,	1455	5.63		
1396	5.41		1426	4.87		1456	4.99		
1397	5.33		1427	5.54		1457	4.80		
1398	5.28		1428	5.10		1458	5.43		
1399	4.96	-	1429	4.61		1459	5.22		
Ŀ	By Dam	217	. L	By Dam	220	L	Ry Dam	223	
1401	5.26		1431	4.88		1461	4.58		
1402	4.75		1432	4.63		1462	4.48		
1403	5.62		1433	4.47		1463	5.10		
1404	5.58		1434	4.46		1464	4.97		
1405	5.24		1435	5.10		1465	5.63		
1406	5.74		1436	4.76		1466	4.98		
· 1407	5.54		1437	4.90		1467	5.69		
1408	5.66		1438	4.69		1468	5.08		
1409	5.52		1439	5.23		1469	4.48		
1	By Dam	218	1	By Dam	221	1	By Dam	224	
1411	5.26		1441	4.75		1471	5.17		
1412	4.81		1442	5.05		1472	4.61		
1413	5.83	301	1443	4.81		1473	4.51		
1414	4.94		1444	5.28	1	1474	5.72		
1415	5.34	-	1445	4.87		1475	4.99		
1416	5.33		1446	5.07		1476	6.34	308	
1417	4.85		1447	5.11		1477	5.12		
1418	4.84		1448	4.79		1478	4.91		
1419	4.59		1449	4.18		1479	5.32		

TABLE 59.—Continued

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Register	By Dam		ercent.	Register	By Dam	Oil, p	Oil, percent.	
ear No.	No.	Seed ear planted.	Crophar- vested.		No.	Seed ear planted.	Crophar- vested.	
301 302 303 304 305 306	218 211 210 208 215 212	5.83 5.90 6.08 6.28 6.47 6.71	5.49 5.68 5.82 5.62 5.94 5.66	307 308 309 310 311 312	212 224 207 204 214 202	6.49 6.34 6.09 5.90 5.89 5.89	5.95 5.61 5.48 5.53 5.47 5.40	
		6.15	5.64					

TABLE 60.—THIRD GENERATION HIGH OIL PLOT RECORD 1899

TABLE 61.-OIL IN ONE HUNDRED EIGHT INDIVIDUAL EARS FROM HIGH-OIL PLOT

OF 1899

Annual ear No.	Oií, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned,
I	By Dam	301	L	By Dam	305	B	y Dam	
2001	5.07	1	2041	5.21		2081	5.07	
2002	5.28		2042	5.24		2082	5.43	
2003	5.52		2043	6.21	402	2083	5.31	
2004	5.07		2044	5.38		2084	5.67	
2005	5.50		2045	6.20	411	2085	6.22	410
2006 2007	5.61 6.42	407	2046	5.63		2086 2087	5.59 5.23	
2007	5.91	405	2047	6.34 5.87		2087	5.23	
2008	5.73		2048	5.65		2088	6.09	
	By Dam	202		By Dam			y Dam 3	
2011	-	302	2051	-	300	2091	5.94	1
2011	5.35		2051	5.84	-	2091	6.12	
2012	5.71		2052	5.76		2092	5.49	
2014	5.77		2054	5.43		2094	6.15	
2015	5.34		2055	5.77		2095	5.17	
2016	5.10		2056	5.96		2096	5.90	
2017	5.74		2057	6.18	401	2097	5.39	
2018	4.30		2 58	6.16		2098	5.48	
2019	6.01	1	2059	5.63		2099	5.56	
	By Dam	303		By Dam	307		y Dam	311
2021	5.65		2061	5.80		2101	4.89	- 400
$2022 \\ 2023$	6.09 5.85		2062 2063	5.87 5.50		2102 2103	6.33 6.35	408
2023	6.27	409	2063	5.90		2103	6.10	404
2025	5.54	402	2065	5.38		2105	5.38	
2026	6.02		2066	5.46		2106	5.69	
2027	6.43	407	2067	5.83		2107	4.74	İ
2028	5.70		2068	6.18	412	2108	5.24	
2029	5.37		2069	6.06	1	2109	6.02	1
Ŀ	By Dam	304		By Dam	308		y Dam 3	312
2031	5.31		2071	5.35		2111	4.96	
2032	5.91		2072	5.84		2112	5.86	
2033	5.26	106	2073	6.22	403	2113	5.40 5.11	
2034 2035	6.54 5.84	406	2074 2075	4.84 5.82		2114 2115	5.11 4.93	
2035	5.97		2075	5.82		2115	5.61	
2037	5.06		2077	6.08	-	2117	5.00	
2038	5.39		2078	5.40		2118	5.28	
2039	5.56		2079	5.32		2119	6.04	

[September,

Register	By Dam No.	· Oil, pe	ercent.	Register	By Dam	Oil, pe	Oil, percent.	
ear No.		Seed ear planted.	Crophar- vested			Seed ear planted.	Crophar- vested.	
401 402 403 404 • 405 406	306 305 308 311 301 304	$\begin{array}{c} 6.18 \\ 6.21 \\ 6.22 \\ 6.35 \\ 6.42 \\ 6.54 \end{array}$	$5.93 \\ 6.29 \\ 6.04 \\ 6.16 \\ 6.17 \\ 6.30$	407 408 409 410 411 412	303 311 303 309 305 307	$\begin{array}{c} 6.43 \\ 6.33 \\ 6.27 \\ 6.22 \\ 6.20 \\ 6.18 \end{array}$	$5.92 \\ 6.29 \\ 5.92 \\ 5.91 \\ 6.27 \\ 6.24$	
Average of plot 6.30 6.12								

TABLE 62.—FOURTH GENERATION HIGH OIL PLOT RECORD 1900

TABLE 63.—OIL IN ONE HUNDRED EIGHT INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1900

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
1	By Dam	401	E	By Dam	405	1	By Dam	400
3201	5.63		3241	6.30		3281	5.32	1-2
3202	5.71		3242	5.68		3282	6.34	
3203	6.61	513	3243	5.78		3283	5.66	
3204 3205	5.31 6.30		3244 3245	6.57 5.97		3284 3285	6.57 5.81	
3205	6.77	505	3245	6.05		3285	6.31	
3207	6.18	000	3247	6.51		3287	5.41	
3208	5.58		3248	6.74	510	3288	6.20	
3209	5.94		3249	6.29		3289	5.44	
	By Dam	402		By Dam	406		By Dam	
3211	6.18		3251	5.43		3291	6.67	512
3212 3213	6.46 6.60		3252 3253	$6.14 \\ 6.22$		3292 3293	6.47 5.30	
3213	6.03		3253	5.43		3293	5.78	
3215	5.67		3255	6.37		3295	6.74	504
3216	6.14		3256	6.33		3296	4.60	
3217	6.23		3257	6.51		3297	6.02	
3218 3219	6.64 6.38	502	3258 3259	6.58 6.26	501	3298 3299	5.60	
	By Dam	102		By Dam	107		By Dam	111
3221	5.72	403	3261	5.63	407	3301	5.51	411
3222	6.15		3262	6.73	511	3302	6.03	
3223	5.51		3263	5.46		3303	6.58	514
3224	6.29		3264	6.91	508	3304	6.79	509
3225	6.10		3265	5.82		3305	6.31	
3226 3227	5.70 6.88	506	3266 3267	5.94 5.76		3306 3307	5.71 5.80	
3228	5.08	300	3268	5.60		3308	5.98	
3229	5.94		3269	6.39		3309	5.95	
Ŀ	By Dam	404	Ŀ	By Dam	408	E	By Dam	412
3231	6.29		3271	6.25		3311	5.81	
3232	6.16		3272	6.44		3312	6.29	
3233	6.26		3273	6.31		3313	6.32	502
3234 3235	5.99	507 ·	3274 3275	5.85		3314 3315	6.73 6.38	503
3236	5.84	007	3276	6.24		3316	5.70	
3237	6.09	1	3277	6.14		3317	5.96	
3238	6.07		3278	6.14		3318	6.28	
3239	6.53		3279	6.27	2	3319	6.45	

TEN GENERATIONS OF CORN BREEDING.

Register	By Dam		ercent.	Register	By Dam		ercent.	
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.	No.		Crophar- vested.	
501 502 503 504 505 506 507	406 402 412 410 401 403 404	6.58 6.64 6.73 6.74 6.77 6.88 7.40	5.69 5.97 5.98 6.10 5.97 5.92 6.35	508 509 510 511 512 513 514	407 411 405 407 410 401 411	$\begin{array}{c} 6.91 \\ 6.79 \\ 6.74 \\ 6.73 \\ 6.67 \\ 6.61 \\ 6.58 \end{array}$	$\begin{array}{c} 6.25 \\ 6.09 \\ 6.09 \\ 6.41 \\ 6.55 \\ 6.05 \\ 5.83 \end{array}$	
Average of plot 6.77								

TABLE 64.—FIFTH GENERATION HIGH OIL PLOT RECORD 1901

1908.]

BULLETIN NO. 128. [September,

Annua1	Oil,	Register	Annual	Oil,	Register No.	Annual	Oil,	Register
ear No.	percent.	No. assigned.	ear No.	percent.	No. assigned.	ear No.	percent.	No. assigned.
				1	assigned.			assigned.
1	By Dam	501	1	By Dam	505	B	y Dam	510
3891	6.55		3931	5.59		3981	5.94	
3892	6.58		3932	6.53		3982	5.37	-
3893	5.68		3933	6.55		3983	5.61	
3894	4.92		3934	5.68		3984	5.61	
3895 3896	$5.77 \\ 6.26$		3935	6.64 6.75		3985	6.22 6.20	
3897	6.01		3936 3937	6.48		3986 3987	6.66	
3898	6.35	1	3938	5.92		3988	5.92	
3899	5.56		3939	5.81		3989	5.59	
	By Dam	502		By Dam	506		y Dam	577
3901	5.96		3941	6.56		3991	6.57	1
3902	5.72		3942	6.02		3992	6.78	601
3903	6.08		3943	6.62		3993	6.17	001
3904	6.27		3944	6.62		3994	6.51	
3905	6.61		3945	6.20		3995	6.74	
3906	6.55		3946	5.97		3996	6.68	
3907	6.14		3947	5.43		3997	6.07	
3908	6.09		3948	6.43		3998	7.05	605
3909	6.44		3949	5.95		3999	5.34	1
Ŀ	By Dam	503	L	By Dam	507	By Dam 512		
3911	6.25	1	3951	6.67		4001	6.24	1
3912	6.05		3952	7.03	610	4002	6.83	602
3913	5.69		3953	6.51		4003	6.85	612
3914	5.92		3954	6.57		4004	6.52	
3915	6.25		3955	6.60		4005	7.01	604
3916 3917	$6.53 \\ 5.27$	a .	3956	6.50		4006	6.61	
3918	6.09		3957 3958	$\begin{array}{c} 5.98 \\ 6.18 \end{array}$		4007 4008	6.36 6.43	
3919	7.09	606	3959	6.87	603	4009	5.92	
	By Dam			By Dam	·		y Dam	1
3921	6.53		3961	6.66		4011	6.01	
3922	6.63		3962	5.89		4012	6.62	
3923	7.13	607	3963	7.10	608	4013	5.12	
3924	6.52		3964	6.14		4014	5.61	
3925	6.16		3965	5.90		4015	6.24	
3926	6.49		3966	6.61	609	4016	6.08	
3927 3928	5.66 6.31		3967 3968	$7.07 \\ 6.08$	609	4017 4018	5.90 6.35	
3929	6.50	-	3969	6.00		4018	5.74	
522	0.50	·		By Dam	500		y Dam	- 7 4
			3971	6.64	509	4021	5.88	14
			3972	6.19		4022	5.89	
			3973	6.14		4023	5.78	
			3974	6.55		4024	5.84	
			3975	6.81	613	4025	6.46	
			3976	6.72	614	4026	5.83	
			3977	7.00	611	4027	-5.87	
			3978	6.26		4028	6.46	
			3979	6.01		4029	5.74	

TABLE 65 .- OIL IN ONE HUNDRED TWENTY SIX INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1901

TEN GENERATIONS OF CORN BREEDING.

Register	By Dam		ercent.	Register	By Dam		ercent.
ear No.	No.		Crophar- vested.		No.		Crop har- vested.
601 602 603 604 605 606 607	511 512 507 512 511 503 504	6.78 6.83 6.87 7.01 7.05 7.09 7.13	6.18 6.61 6.21 6.65	608 609 610 611 612 613 614	508 508 507 509 512 509 509	$7.10 \\ 7.07 \\ 7.03 \\ 7.00 \\ 6.85 \\ 6.81 \\ 6.72$	6.65 6.65 6.50 6.48 6.08 6.11
·	Avera	6.95	6.41				

TABLE 66.—SIXTH GENERATION HIGH OIL PLOT RECORD 1902

[September,

Annual ear No.Oil, percent.Register No. assigned.Annual ear No.Oil, percent.Register No. assigned.Annual ear No.Oil, percent.Register No. assigned.Annual ear No.Oil, percent.Register No. assigned.Annual ear No.Oil, percent.Register No. assigned.By Dam 6o2By Dam 6o7By Dam 6o7By Dam 61243715.8244015.9844417.3771	ed.
4371 5.82 4401 5.98 4441 7.37 71	1
4371 5.82 4401 5.98 4441 7.37 71	1
	1
4372 6.50 703 4402 6.09 4442 5.82	
43 73 6.15 4403 7.00 4443 6.40	
4374 7.04 710 4404 7.08 4444 6.27	
4375 5.43 4405 6.38 4445 6.28	
4376 6.50 720 4406 5.85 4446 5.11	
4377 6.04 4407 6.68 4447 5.67	
4378 5.76 4408 6.77 4448 6.78 71	5
4379 6.44 4409 6.62 4449 6.36	
By Dam 604 By Dam 609 By Dam 613	
4381 6.94 4411 7.00 709 .4451 6.34	
4382 6.41 722 4412 6.87 715 4452 5.95 4382 6.41 722 4412 6.87 715 4452 5.95	
4383 5.29 4413 6.65 718 4453 5.86 4384 6.21 4414 6.85 707 4454 5.86	
4385 6.68 705 4417 6.63 707 4434 5.80 4385 6.68 705 4415 6.70 717 4455 6.06	
4386 5.30 4416 6.31 4456 6.43 70	
4387 6.38 4417 7.00 714 4457 6.10	-
4388 5.66 4418 5.35 4458 6.21	
4389 6.56 704 4419 6.36 4459 5.83	
By Dam 606 By Dam 610 By Dam 614	
4391 5.14 4421 7.02 713 4461 5.59	
4392 5.50 4422 6.50 702 4462 6.74 70	5
4393 5.74 4423 6.94 708 4463 6.00	
4394 5.04 4424 6.67 4464 6.28 4395 6.40 4425 6.61 4465 5.92	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2
4397 6.26 4427 6.69 4467 5.98	·
4398 5.17 4428 6.13 4468 5.67	
4399 6.14 4429 6.27 4469 6.00	
By Dam 611	
4431 6.50 721	
4432 6.77	
4433 6.67	
4434 6.17 4435 6.22	
4435 0.22 4436 7.17 712	
4437 6.92	
4438 6.13	
4439 6.45	

TABLE 67 .- OIL IN NINETY INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1902

1908.] TEN GENERATIONS OF CORN BREEDING.

Register	By Dam	Oil, po	ercent.	Register	By Dam	Oil, p	ercent.
ear No.	No.	Seed ear planted.	Crop har- vested.	ear No.	No.	Seed ear planted.	Crophar- vested.
701 702 703 704 705 706 707 708 709 710 711	$\begin{array}{c} 613\\ 610\\ 602\\ 604\\ 604\\ 614\\ 609\\ 610\\ 609\\ 602\\ 612\\ \end{array}$	$\begin{array}{c} 6.43\\ 6.50\\ 6.50\\ 6.56\\ 6.68\\ 6.74\\ 6.85\\ 6.94\\ 7.00\\ 7.04\\ 7.37\\ \end{array}$	6.25 6.54 6.68 6.62	712 713 714 715 716 717 718 719 720 721 722	$\begin{array}{c} 611\\ 610\\ 609\\ 609\\ 612\\ 609\\ 609\\ 614\\ 602\\ 611\\ 604 \end{array}$	$\begin{array}{c} 7.17\\ 7.02\\ 7.00\\ 6.87\\ 6.78\\ 6.70\\ 6.65\\ 6.56\\ 6.56\\ 6.50\\ 6.50\\ 6.41 \end{array}$	7.04 6.39 6.61 6.24 6.35 6.25
Av	6.73	6.50					

TABLE 68.—SEVENTH GENERATION HIGH OIL PLOT RECORD 1903

BULLETIN No. 128. [September,

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Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent	Register No. assigned.
	By Dam	701	Ŀ	ly Dam	710		By Dam	718
1 2 3 4 5 6	6.20 6.35 6.23 6.44 6.09		31 32 33 34 35	6.81 6.97 6.19 6.99 6.72	804 818	71 72 73 74 75	6.28 5.73 6.25 6.23 6.82	801
7 8 9 10	6.04 5 75 6.35 6.73 6.84 By Dam		36 37 38 39 40	6.50 6.60 6.95 7.10 663.	820 807	76 77 78 79 80	6.51 6.09 6.82 7.02 5.63	805
11 12 13 14 15 16 17 18 19 20	5.88 6.20 5.70 6.39 7.08 6.37 6.13 6.49 6.59 5.92	816	41 42 43 44 45 46 47 46 47 48 49 50	<i>By Dam</i> 7.41 6.98 7.71 6.56 7.31 6.61 7.16 7.06 6.46 6.94	713 813 819 811 809 815 806 803	81 82 83 84 85 86 87 88 88 89 90	By Dam 6.53 5.90 6.65 6.43 5.83 6.26 6.33 6.16 6.62 6.41	719
1	By Dam	709		By Dam	715	[]	By Dam	721
21 22 23 24 25 26 27 28 29 30	$\left \begin{array}{c} 6.68\\ 6.34\\ 7.33\\ 6.68\\ 7.56\\ 6.37\\ 6.47\\ 6.78\\ 6.69\\ 7.29\end{array}\right $	810 812 814	51 52 53 54 55 56 57 58 59 60	$ \begin{bmatrix} 6.90 \\ 6.33 \\ 7.05 \\ 7.27 \\ 5.74 \\ 6.51 \\ 5.69 \\ 6.12 \\ 6.77 \\ 6.78 \end{bmatrix} $	821 817 808	91 92 93 94 95 96 97 98 99 100		822
				By Dam	717			
		•	61 62 63 64 65 66 67 68 69 70	$ \begin{bmatrix} 6.60 \\ 6.90 \\ 6.70 \\ 5.80 \\ 6.35 \\ 6.76 \\ 6.09 \\ 5.96 \\ 6.44 \\ 5.52 \end{bmatrix} $	802			

TABLE 69 .- OIL IN ONE HUNDRED INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1903

TEN GENERATIONS OF CORN BREEDING.

Register	By Dam	Oil, p	ercent.	Register	By Dam	Oil, p	ercent.
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.	No.	Seed ear planted.	Crop har- vested.
801 802 803 804 805 806 807 808 809 810 811	718 717 713 710 718 713 713 715 713 709 713	$\begin{array}{c} 6.82\\ 6.90\\ 6.94\\ 6.97\\ 7.02\\ 7.06\\ 7.10\\ 7.27\\ 7.31\\ 7.33\\ 7.71\\ \end{array}$	6.82 6.81 6.69 7.32	812 813 814 815 816 817 818 819 820 821 822	709 713 709 713 702 715 710 713 710 715 715 721	$\begin{array}{c} 7.56 \\ 7.41 \\ 7.29 \\ 7.16 \\ 7.08 \\ 7.05 \\ 6.99 \\ 6.98 \\ 6.95 \\ 6.90 \\ 6.81 \end{array}$	7.02 7.13 7.16 7.06 7.17 6.47
	' Avera	7.16	6.97				

TABLE 70.—EIGHTH GENERATION HIGH OIL PLOT RECORD 1904

[September,

BULLETIN NO. 128.

OIL FLOT OF 1904											
Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.			
Ŀ	By Dam	802	1	By Dam	810	By Dam 816					
1 2 3 4 5 6	7.73 6.62 7.36 7.55	912 ⁻ 901	31 32 33 34	7.53 7.31 6.88 7.72	909	71 72 73 74	8.44 6.82 8.03 7.24	908 915			
7 8 9	7.39 7.10 7.33 7.22 6.87		35 36 37 38 39	7.63 6.86 7.43 7.41 6.88	914	75 76 77 78 79	6.94 7.68 8.30 7.54 7.52	918			
10	4.88 Ry Dam	801	40	7.62 – 3v Dam	925 812	80 <i>R</i>	7.14 v Dam 3	 818			
11	7.00		41	6.68		81	7.39				
12 13	$7.36 \\ 7.02$		42 43	6.27 8.09	917	82 83	$7.41 \\ 6.54$	910			
14 15	7.43		44	7.69	922 907	84	7.28	923			
16	6.29 6.29		45 46	6.31	907	85 86	$7.03 \\ 7.68$				
17 18	7.57 7.99	913 920	47 48	6.25 6.87		87 · 88	$\begin{array}{c} 7.10 \\ 7.22 \end{array}$				
19 20	6.74 7.44		49 50	$7.20 \\ 7.23$		89 90	$7.24 \\ 7.26$	1			
	y Dam	808		By Dam	813	B	y Dam	822			
21 22 23 24	7.09 7.95 6.94 7.03	904	51 52 53 54	6.75 6.78 6.89 7.50	919	91 92 93 94	6.02 6.51 6.18 6.62				
25 26	7.32	911	55 56	$7.17 \\ 7.70$	906	95 96	6.60 6.37				
27 28	6.95 6.54		57 58	$6.84 \\ 7.49$	924	97 98	6.35 5.97				
29 30	6.81 7.32		59 60	7.43 6.87		99 100	6.21 7.13	905			
30	1.54			By Dam	814	101	7.56	902			
			61	7.05							
			62 63	6.81 7.92	921						
			64 65	8.14 7.82	916						
			66 67	6.47 6.82							
			68 69	6.60 6.38							
			09 70	7.94	903						

TABLE 71.—OIL IN ONE HUNDRED ONE INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1904

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TEN GENERATIONS OF CORN BREEDING.

Register	By Dam		ercent.	Register	By Dam	Oil, pe	rcent.
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.	No.	Seed ear planted.	Crophar- vested.
901 902 903 904 905 906 907 908 909 910 911 912 913	802 822 814 808 822 813 812 816 810 818 808 808 802 804	$\begin{array}{c} 7.55\\ 7.56\\ 7.94\\ 7.95\\ 7.13\\ 7.70\\ 7.58\\ 8.44\\ 7.72\\ 7.41\\ 7.37\\ 7.73\\ 7.57\end{array}$	6.98 7.55 7.30	914 915 916 917 918 919 920 921 922 922 922 923 924 925	810 816 814 812 816 813 804 813 804 814 812 818 813 810	$\begin{array}{c} 7.63\\ 8.03\\ 8.14\\ 8.09\\ 8.30\\ 7.50\\ 7.99\\ 7.92\\ 7.69\\ 7.69\\ 7.49\\ 7.62\\ \end{array}$	7.11 7.68 7.12
	Avera	7.88	7.29				

TABLE 72.—NINTH GENERATION HIGH OIL PLOT RECORD 1905

TABLE 73.—OIL IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1905

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	
· B	By Dam	902	E	By Dam	910	B	By Dam 918		
1 2 3 4 5 6 7 8	6.67 6.40 8.38 6.32	1002	41 42 43 44	7.28 7.36 6.27 6.59		81 82 83 84	7.78 7.02 8.57 7.73	1010	
5 6 7 8 9 10	7.24 6.43 6.71 7.12 6.73 6.68		45 46 47 48 49 50	6.28 7.02 7.44 6.63 7.84 7.86	1011 1006	85 86 87 88 89 90	7.74 7.41 7.46 7.12 7.49 8.59	1022	
11 12 13 14 15	6.84 7.57 6.55 6.76 7.56	1014 · 1007	51 52 53 54 55	7.18 7.83 7.68 7.18 7.77	.1023	91 92 93 94 95	7.51 7.50 7.81 7.57 7.87		
16 17 18 19 20	6.84 6.79 7.21 7.46 7.30	1019	56 57 58 59 60	7.69 7.10 6.87 8.24 7.87	1018	96 97 98 99 100	7.79 7.89 8.00 7.39 7.30	1003 1015	
В	By Dam	904	B	ly Dam	916	B	y Dam	920	
21 22 23 24 25 26 27	$\begin{array}{c} 7.35 \\ 6.58 \\ 7.90 \\ 7.20 \\ 7.32 \\ 7.33 \\ 8.33 \end{array}$	1004	61 62 63 64 65 66 67	7.18 7.65 6.88 6.39 7.65 8.00 7.02	1008 1001	101 102 103 104 105 106 107	7.15 6.69 6.93 7.20 7.35 7.02 6.38	1017	
28 29 30 31 32	7.65 7.53 6.76 8.02 8.25	1009	68 69 70 71 72	6.70 6.27 6.58 7.31 7.44		108 109 110 111 112	7.91 8.17 7.38 6.95 6.53	1012 1005	
33 34 35 36 37	6.79 8.33 6.66 7.58 7.71	1021	73 74 75 76 77	6.67 7.15 7.38 7.04 7.76	1020	113 114 115 116 117	7.76 7.20 6.97 7.06 6.95	1024	
38 39 .40	7.98 7.26 8.50	1016	78 79 80	6.82 6.74 7.53	1013	118 119 120	7.14 6.76 6.87		

Register	By Dam	Oil, pe	rcent.	Register	By Dam	Oil, pe	Oil, percent.	
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.	No.	Seed ear planted.	Crophar- vested.	
1001	916	7.65		1013	916	7.53		
1002	902	8.38		1014	902	7.57	7.50	
1003	918	7.89		1015	918	8.00		
1004	904	8.33		1016	904	8.50		
1005	920	7.38		1017	920	7.34		
1006	910	7.86		1018	910	7.87	6.96	
.1007	902	7.56		1019	902	7.46		
1008	916	7.65	743	1020	916	7.76	7.23	
1009	904	8.25		1021	9.14	8.33		
1010	918	8.57	749	1022	918	8.59		
1011	910	7.84		1023	910	7.83		
1012	920	8.17		1024	920	7.76	7.60	
*	Avera	7.86	7.37					

TABLE 74.-TENTH GENERATION HIGH OIL PLOT RECORD 1906

[September,

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	
B	y Dam	1008	B	y Dam's	014	B	By Dam 1020		
1 2 3 4 5 6	7.70 7.29 7.44 7.31 7.37 7.01		41 42 43 44 45 46	6.98 7.89 7.47 8.02 7.85 7.72	1111 1123	81 82 83 84 .85 .86	6.77 7.62 7.30 6.89 7.45 7.14	1103	
7 8 9 10 11 12	6.94 7.72 7.55 7.02 7.81 7.69	1107 1119	47 48 49 50 51 52	8.23 7.58 7.45 6.88 7.63 7.66	1106	87 88 89 90 91 92	7.10 7.90 7.33 7.26 6.62 7.49	1110	
13 14 15 16 17 18	7.42 7.42 6.87 7.47 7.82 7.30	1102	53 54 55 56 57 58	7.64 6.93 6.67 7.62 6.87 7.47		93 94 95 96 97 98	6.56 7.86 7.48 6.90 7.42 7.41	1122	
19 20	7.58 7.87	1114	59 60	. 7.09 8.39	1118	99 100	6.57 7.53	1115	
B	y Dam	1010	B	y Dam	8101	B	y Dam	1024	
21 22 23 24 25 26 27	7.14 7.47 7.08 7.73 7.92 7.04 7.84	1109	61 62 63 64 65 66 67	7.16 6.59 7.11 6.71 7.43 6.73 6.86	1101 1113	101 102 103 104 105 106 107	7.97 7.52 7.39 7.59 7.33 7.67 7.13	1105	
28 29 30 31 32 33	6.99 7.44 7.47 6.92 7.05 7.94	1121	68 69 70 71 72 73	7.61 7.05 6.96 8.33 6.57 7.02	1108 1120	108 109 110 111 112 113	7.05 8.01 7.61 7.46 7.22 7.76	1112	
34 35 36	7.31 7.28 7.75		74 75 76	6.11 6.88 6.66		114 115 116	8.46 7.60 7.56	1124	
37 38 39 40	8.51 8.05 7.61 7.34	1104 1116	77 78 79 80	6.95 6.68 6.88 6.94		117 118 119 120	7.87 7.82 7.87 7.61	1117	

TABLE 75.—OIL IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM HIGH-OIL PLOT OF 1906

TEN GENERATIONS OF CORN BREEDING.

Register	By Dam No.		ercent.	Register	By Dam No.	Oil, percent.		
ear No.			Crophar. vested,			Seed ear planted.		
101 102 103 104 105 106		4.08 4.09 4.03 4.07 3.95 3.84	3.96 4.21 4.31 4.05 3.79	107 108 109 110 111 112		3.94 4.01 4.12 4.10 4.12 4.14	4.01 4.06 3.97 4.05 4.22	
Average of ten rows harvested 4.03								

TABLE 76.—FIRST GENERATION LOW OIL PLOT RECORD 1897

TABLE 77.-OIL IN FORTY INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1897

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	
Ŀ	By Dam	102	Ь	By Dam	105	By Dam 109			
571 572 573 574	4.00 3.96 3.89 3.83	202	586 587 588 589	4.21 4.74 3.70 3.85	209 201	606 607 608 609	3.50 4.40 3.90 3.90	208	
B	By Dam	103	B	By Dam	106	Bj	Dam 1	10	
576 577 578 579	$\begin{array}{r} 4.21 \\ 4.28 \\ 4.18 \\ 4.41 \end{array}$		591 592 593 594	3.85 3.72 3.38 3.39	212 203 207 205	611 612 613 614	3.84 4.08 4.39 3.39	211 206	
В	ly Dam	104	By Dam 107			B	y Dam		
581 582 583 584	$\begin{array}{r} 4.74 \\ 4.69 \\ 4.65 \\ 4.07 \end{array}$		596 597 598 599	$\begin{array}{r} 4.21 \\ 4.22 \\ 4.42 \\ 4.04 \end{array}$		616 617 618 619	 4.08 4.19 4.43 4.68 		
			B	y Dam	108				
			601 602 603 604	4.68 3.55 3.80 4.42	204 210				

[September,

Register	ByDam	Oil, p	ercent.	Register	By Dam	Oil, percent.	
ear No. No.		Seed ear planted.	Crophar. vested.	37	No.	Seed ear planted.	Crophar- vested.
201 202 203 204 205 206	105 102 106 108 106 110	3.85 3.83 3.72 3.55 3.39 3.39	3.97 4.32 4.08 3.99 3.81 3.81	207 208 209 210 211 212	106 109 105 108 110 106	3.38 3.50 3.70 3.80 3.84 3.85	3.693.783.934.184.214.11
	Avera	3.65	3.99				

TABLE 78 .- SECOND GENERATION LOW OIL PLOT RECORD 1898

TABLE 79.—OIL IN ONE HUNDRED EIGHT INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1898

And and a second									
Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	
By Dam 201		201	E	By Dam	205	L	By Dam 209		
1481	4.11		1521	3.64	301	1561	-	-	
1482	3.88	r	1522	3.27	309	1562	3.73		
1483	3.91		1523	4.10		1563	4.24		
1484	4.02		1524	3.72		1564	3.58	303	
1485	4.29	210	1525	3.89		1565	3.92		
1486	3.39	312	1526	4.02		1566	3.72		
1487 1488	3.76 4.02		1527 1528	4.07 3.90		1567 1568	4.00		
1489	4.02		1528	3.22	308	1569			
	•								
	By Dam	202	1	By Dam		1	By Dam	210	
1491	4.27		1531	3.33	310	1571	4.01		
1492 1493	4.60		1532 1533	3.67 3.86		1572 1573	4.09		
1493	4.12	•	1535	3.67		1573	4.26		
1495	4.19		1535	4.34		1575	4.45		
1496	4.27		1536	3.85		1576	4.19		
1497	4.37		1537	3.50		1577	4.29		
1498	4.52		1538	3.56	304	1578	3.80		
1499	3.82		1539	3.34	306	1579	3.80		
1	By Dam	203	By Dam 207			1	By Dam	211	
1501	4.55		1541	3.83		1581	4.35	1	
1502	4.02		1542	4.11		1582	3.82		
1503	4.25		1543	3.59	314	1583	4.22		
1504	3.38	305	1544	3.66		1584	4.50		
1505	3.77		1545	3.35	311	1585	4.61		
1506 1507	4.35		1546 1547	3.63		1586 1587	4.06 3.75		
1507	4.17		1547	3.65	316	1587	4.39		
1509	3.95		1549	3.72	510	1589	4.45		
By Dam 204		By Dam 208			By Dam 212				
1511	3.98	1	1551	3.89	1	1591	3.95	1	
1512	3.64	315	1552	3.87		1592	4.34		
1513	4.20		1553	3.86		1593	4.17		
1514	4.01		1554	3.79		1594	4.77		
1515	4.10		1555	3.93		1595	4.17		
1516	3.32	307	1556	3.64		1596	3.99		
1517	3.65		1557	3.56	313	1597	3.85		
1518	4.26		1558	3.80	202	1598	4.40		
1519	4.03		1559	3.63	302	1599	3.98	1	

Register	By Dam	Oil, percent.		Register	By Dam	Oil, percent.	
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.		Seed ear planted.	Crophar- vested.
301 302 303 304 305 306 307 308	205 208 209 206 203 206 204 204 205	3.64 3.63 3.58 3.56 3.38 3.34 3.32 3.22	3.85 3.92 3.81 3.88 4.01 3.81 3.59 3.91	309 310 311 312 313 314 315 316	205 206 207 201 208 207 204 207	3.27 3.33 3.35 3.39 3.56 3.59 3.64 3.65	3.73 3.71 3.76 3.76 3.86 3.74 3.94 3.84
		3.47	3.82				

TABLE 80.-THIRD GENERATION LOW OIL PLOT RECORD 1899

[September,

TABLE 81.-OIL IN ONE HUNDRED FORTY-FOUR INDIVIDUAL EARS FROM LOW-OIL

PLOT OF 1899

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
H	By Dam	201	F	By Dam	206	B	y Dam	212
2121	3.89		. 2171	3.55		2231	4.03	1
2121	3.45	404	2172	3.57		2232	3.65	
2123	3.82		2173	3.46	414	2233	4.29	
2124	3.91		2174	3.76		2234	3.55	
2125	4.09		2175	3.91		2235 2236	3.41	412
2126 2127	3.93 3.56		2176 2177	3.60 3.90		2230	4.03	
2128	4.12		2178	4.16		2238	4.10	
2129	3.68		2179	3.79		2239	3.42	405
Ŀ	ly Dam	302	L L	By Dam	307	B	y Dam	313
2131	3.79		2181	2.94	409	2241	4.21	
2132	4.17 3.62		2182	3.53	410	2242 2243	3.63	412
2133 2134	3.82		2183 2184	3.14 3.22	410	2245	3.81	413
2135	4.24		2185	3.58		2245	3.99	
2136	3.54	401	2186	3.69		2246	4.32	
2137	3.74		2187	3.71		2247 2248	3.95	
2138 2139	4.12 4.20		2188 2189	3.60		2248	3.98	
	By Dam	303	1 .	By Dam	208		y Dam	211
2141	3.53	402	2191	4.38		2251	3.90	
2142	4.50		2192	3.93		2252	3.71	
2143	4.21		2193	4.18		2253	3.56	
2144 2145	3.87		2194	4.13		2254 2255	3.68	109
2145	3.55		2195 2196	3.87		2255	2.81	408
2147	3.89		2197	4.21		2257	3.84	
2148	3.94		2198	3.92		2258	4.48	
2149	3.65		2199	3.46	403	2259	3.60	Į
	By Dam	304		By Dam	309	11	y Dam	315
$2151 \\ 2152$	3.62		2201	3.73		2261 2262	4.11 4.25	
2153	3.83		2203	3.52	416	2263	3.93	
2154	3.62		2204	3.69	1	2264	3.67	
2155 2156	4.57		2205	3.57		2265 2266	3.60	415
2150	3.76		2206 2207	3.69		2267	3.49	415
2158	3.89		2208	3.81		2268	3.84	
2159	4.19	1	2209	3.84		2269	3.76	
	By Dam	305		By Dam	310	11	y Dam	316
$\frac{2161}{2162}$	3.68		2211	3.68		2271	4.13	
2162	4.04 3.66		2212	4.26		2272	3.72	
2164	4.38		2214	3.08	407	2274	4.22	
2165	4.16		2215	3.58		2275	3.97	
2166	4.08		2216	3.33		2276	3.78	
$\frac{2167}{2168}$	4.35		2217	3.60		2277	4.14 3.92	
2169			2219		411	2279		
				By Dam				
			2221	3.31	406			
			2222	4.00				
			2223 2224	3.82				
			2225	3.73				
			2226	3.98				
			2227	3.75				
			2228 2229	4.41 3.92				
				1 0.74		- Commencer		

Paristar	ByDam	Oil, pe	ercent.	Register	By Dam	Oil, percent.	
ear No.	No.	Seed ear Crophar- planted. vested.		ear No.	No.	Seed ear planted.	Crop har. vested.
401 402 403 404 405 406 407 408	302 303 308 301 312 311 310 314	3.54 3.53 3.46 3.45 3.42 3.31 3.08 2.81	3.61 3.67 3.55 3.52 3.99 3.43 3.33 3.39	409 410 411 412 413 414 415 416	307 307 310 312 313 306 315 309	$\begin{array}{c} 2.94 \\ 3.14 \\ 3.32 \\ 3.41 \\ 3.47 \\ 3.46 \\ 3.49 \\ 3.52 \end{array}$	3.36 3.40 3.61 3.65 3.68 3.71 3.71 3.43
	3.33	3.57					

TABLE 82.-FOURTH GENERATION LOW OIL PLOT RECORD 1900

[September,

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$										
By Dam 401By Dam 401By Dam 405By Dam 406By Dam 4013321 4.35 3371 3.35 3421 3.50 3322 3.55 3372 3.42 3422 3.59 3324 3.16 501 3374 3.35 3424 3.242 3326 3.42 3375 3.54 3423 3.26 3326 3.42 3375 3.54 3423 3.26 3326 3.42 3377 3.23 3427 3.90 3327 3.68 3377 3.22 3427 3.90 3323 3.68 3377 3.23 3423 3.66 3329 3.68 3377 3.23 3423 3.89 3333 3.44 3383 3.66 3433 3.38 3334 3.61 3384 3.77 3434 3.77 3335 3.64 3387 3.31 3437 3.71 3334 3.61 3387 3.31 3437 3.71 3334 3.26 3393 2.94 510 3441 3.30 3344 3.26 3393 3.43 3444 3.93 3344 3.26 3393 3.43 3451 3.56 3344 3.94 3395 2.56 507 34444 3.83 3344 3.94 3393 3.43 3451 3.56 3344 3.94 3393 3.45 3.59 3344 3.94	Annual	Oil,	No.			No.			No.	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	car 100.	percenti	assigned.		percenti	assigned.		percenti	assigned.	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	By Dam 401				By Dam 406			By Dam 411		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						510				
3325 3.32 3375 3.54 3425 3.86 3326 3.42 3376 3.03 502 3426 3.59 3327 3.69 3377 3.22 3427 3.90 3328 4.43 3379 3.55 3428 3.46 3329 3.68 3379 3.55 3429 3.63 By Dam 402By Dam 407By Dam 412 3331 3.49 3381 3.76 3431 3.55 3332 3.70 3382 3.34 3433 3.88 3333 3.44 3383 3.66 3433 3.88 3334 3.61 3384 3.27 3434 3.77 3336 3.26 3386 3.23 3336 3.24 3337 3.1 3437 3.71 3336 3.24 3337 3.23 3389 2.97 504 3439 3.75 By Dam 403By Dam 408By Dam 413 3344 3.26 3391 2.94 510 3441 3.30 3344 3.26 3394 3.37 3444 3.93 3344 3.26 3396 3.20 3444 3.95 3345 3.94 3397 3.66 3447 3.68 3344 3.27 3396 3.22 514 By Dam 404By Dam 409By Dam 413 3345 3.90 3401 3.68 3355 3.90 3402 3.81 <td></td> <td></td> <td>504</td> <td></td> <td></td> <td>512</td> <td></td> <td></td> <td></td>			504			512				
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$			501							
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						502				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						302	1			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $										
By Dam 402 By Dam 407 By Dam 407 By Dam 412 33313.4933813.7634313.5533323.7033823.3434323.8933333.4433833.6634333.3833343.6133843.2734343.7733353.6433853.5534353.2433374.0833873.3133363.3633374.0833873.3134373.7133384.3033883.2834383.8233393.2333912.9451034413.3033413.2633912.9451034413.3033443.3733943.3734443.8333443.363.2034443.8333453.9433952.5650734473.6634473.6833483.4433984.0333483.4433993.4133513.31340133523.9034023.8133553.0951334053.5433563.5550634574.3133583.4334032.6550633543.5134063.5033553.0951334053.5433563.5434063.5033573.2534073.3733583.4334082.										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		•	402		•	407			412	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	3331	3.49		3381	3.76		3431	3.55	ĺ.	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	3332	3.70		3382	3.34		3432	3.89		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $							3433	3.38		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $							3434	3.77		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						504				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		•			4 · ·				I	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		-	403					-	413	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						510				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						507				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						007	-			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	3348	3.44		3398	4.03					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3349	3.45		3399	3.41		5449	3.22	514	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		-	404		-	409		-	414	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$										
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						500				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						508				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			512							
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			515							
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$										
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$						506				
By Dam 405 By Dam 410 By Dam 415 3361 4.52 3411 4.19 3461 3.71 3362 3.96 3412 2.89 505 3462 3.36 3363 4.06 3413 3.75 3463 3.68 3463 3.68 3365 4.07 3415 3.20 3465 3.39										
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Z		405	1	By Dam	410	E	,	415	
3363 4.06 3413 3.75 3463 3.68 3364 4.05 3414 3.47 3464 4.05 3365 4.07 3415 3.20 3465 3.39										
3364 4.05 3414 3.47 3464 4.05 3365 4.07 3415 3.20 3465 3.39						505				
3365 4.07 - 3415 3.20 3465 3.39										
3300 4.02 3410 3.47 3460 4.14			-							
						502	-			
3367 3.62 3417 3.02 503 3467 3.81 3368 4.01 3418 3.44 3468 3.31						505				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$										
					0.05		0105	0.00		

TABLE 83.—OIL IN ONE HUNDRED FORTY-FOUR INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1900

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è

TEN GENERATIONS OF CORN BREEDING.

Annual ear No.	Oil, percent.	Register No. assigned.	
Ŀ	By Dam	416	
3471	3.39		
3472	3.28		
3473	3.84	500	
3474 3475	$2.87 \\ 3.78$	509	
3476	2.97	511	
3477	3.38	011	
3478	4.05		
3479	3.71		

TABLE 83.—Continued.

TABLE 84.-FIFTH GENERATION LOW OIL PLOT RECORD 1901

Register ear No.	By Dam		ercent.	0	By Dam No.	Oil, percent.	
	No.		Crophar- vested.				Crophar- vested.
501 502 503 504 505 506 507	401 406 410 407 410 409 408	3.163.033.022.972.892.652.56	3.48 3.41 3.54 3.32 3.47 3.31 3.32	508 509 510 511 512 513 514	409 416 408 416 406 404 413	2.652.872.942.973.033.093.22	3.37 3.64 3.44 3.35 3.42 3.44 3.48
		Average	of plot			2.93	3.43

[September,

					··			
Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
1	By Dam	501	I	By Dam	505	B	y Dam 3	10
4031	3.31		4071	3.60		4121	3.60	
4032 4033	3.96		4072 4073	3.75		4122 4123	3.25 3.29	
4034	3.32		4074	3.77		4124	3.41	
4035	3.53		4075 4076	3.37		4125	3.42	
4036 4037	3.31 3.90		4078	3.72		4120	3.65	
4038	3.35		4078	3.45		4128	3.58	
4039	3.34		4079	3.56	r06	4129	3.54	
4041	By Dam . 3.57	502	4081	By Dam . 3.18	500	4131	y Dam 5 3.47	1
4041	3.42		4082	3.75		4132	3.00	604
4043	3.26	64.0	4083	3.50		4133	3.45	
4044 4045	3.09 3.29	613	4084	3.52 3.29		4134 4135	3.11 3.23	
4046	3.81		4086	2.78	607	4136	3.38	
4047	3.65	614	4087 4088	3.17 3.56		4137 4138	3.44 3.40	
4048 4049	3.16 3.77	014	4089	3.80		4130	3.66	
	By Dam	503	E	By Dam	507	B	y Dam g	512
4051	3.06	603	4091	3.21	600	4141	3.32	-
4052 4053	3.93		4092 4093	3.08 3.88	602	4142	2.93	606
4054	3.69		4094	3.70		4144	3.68	
4055	3.42		4095	3.24 3.35		4145	3.03	611
4056 4057	3.52		4096 4097	3.22		4146	3.62	
4058	3.57		4098	3.07	612	4148	3.62	
4059	3.32		4099	3.26 By Dam	508	4149	3.39 y Dam 3	
4061	<i>By Dam</i> 2.96	605	4101	2.95	609	4151	3.56	1 =
4062	3.66	000	4102	3.33		4152	4.17	
4063	2.97	610	4103	3.82		4153	3.78	
4064 4065	3.34		4105	3.35		4155	3.53	
4066	3.36		4106	3.47		4156	3.37	
4067 4068	3.22 3.78		4107	3.47 3.18		4157 4158	3.65	
4069	3.47		4109	3.20		4159	2.97	
				By Dam	509		y Dam 3	14
	•		4111 4112	3.73		4161 4162	3.40	
			4112	3.38		4162	4.09	
			4114	3.61		4164	3.64	
			4115 4116	3.49		4165 4166	$3.69 \\ 2.87$	608
			4117	3.63		4167	3.38	000
			4118	3.10	601	4168	3.87	
			4119	3.64	1]	4169	3.55	1

TABLE 85.—OIL IN ONE HUNDRED TWENTY-SIX INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1901

1908.]

Paristar	By Dam	Oil, pe	ercent.	Register	By Dam	Oil, per	rcent.
ear No.	No.	Seed ear planted.		ear No.	No.	Seed ear planted.	
601	509	3.10		608	514	2.87	
602	507	3.08	3.16	609	508	2.95	3.03
603	503	3.06	3.18	610	504	2.97	
604	511	3.00	2.92	611	512	3.03	2.84
605	504	2.96	2.86	612	507	3.07	3.01
606	512	2.93	3.02	613	502	3.09	
607	506	2.78	2.80	614	502	3.16	3.32
Ave	erage of t	ten selecte	ed rows			3.00	3.02

TABLE 86.—SIXTH GENERATION LOW OIL PLOT RECORD 1902

TABLE 87 .-- OIL IN NINETY INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1902

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
· E	By Dam	602	E	By Dam	605	E	By Dam	611
4471 4472	3.32 2.80		4501 4502	2.83	717	4541 4542 4543	3.17 2.85 3.21	
4473 4474 4475	3.55 2.67 3.37	718	4503 4504 4505	3.21 3.03 2.75	721	4544 4545	2.87 2.83	
4476 4477	3.41 3.08		4506 4507	2.78 2.81	701	4546 4547 4548	2.79 2.80 2.54	709
4478 4479	3.04 3.28		4508 4509	2.83 2.52	713	4549	2.87	
E	By Dam	603	E	By Dam	606	1	By Dam	612
4481 4482 4483 4484	2.94 2.86 3.16 3.05		4511 4512 4513 4514	3.06 2.44 3.36 2.98	710	4551 4552 4553 4554	$ \begin{array}{r} 3.53 \\ 3.01 \\ 2.65 \\ 2.66 \\ \end{array} $	716 705
4485 4486 4487 4488 4489	3.66 2.65 3.39 3.51 3.03	707	4515 4516 4517 4518 4519	2.79 3.16 3.07 2.83 3.23	722	4555 4556 4557 4558 4559	2.65 2.83 3.44 3.12 3.28	706
	By Dam	604		By Dam	607		By Dam	611
4491 4492 4493	2.60 2.93 3.19	708	4521 4522 4523	2.12 3.06 2.93	711	4561 4562 4563 4564	3.80 3.56 3.76 3.20	
4494 4495 4496 4497 4498 4499	$\begin{array}{c} 2.78 \\ 2.59 \\ 2.67 \\ 3.33 \\ 2.87 \\ 2.72 \end{array}$	714 704 703	4524 4525 4526 4527 4528 4529	2.90 3.06 3.54 2.63 2.70 2.87	715 719	4565 4566 4567 4568 4569	$\begin{array}{c} 3.20 \\ 3.29 \\ 3.03 \\ 3.52 \\ 2.74 \\ 3.07 \end{array}$	702
			1	By Dam	609			
			4531 4532 4533 4534 4535 4536 4537 4538 4539	$ \begin{array}{c c} 3.12 \\ 2.92 \\ 2.83 \\ 2.80 \\ 2.73 \\ 3.16 \\ 2.41 \\ 2.74 \\ 3.65 \end{array} $	720 712			n .

[September,

Register	By Dam		ercent.	Register	By Dam		ercent.
ear No.	No.		Crophar- vested.	0	No.	Seed ear planted.	Crophar- vested.
701 702	605 614	$2.78 \\ 2.74$		712 713	609 605	2.41	$2.82 \\ 3.01$
702 703 704	604 604	2.74 2.72 2.67		713 714 715	604 607	2.59	*
705 706	612 612	2.66		716 717	612 605	2.65	3.24
707 708	603 604	2.65 2.60	3.04	718 719	602 607	2.67	2.81 3.01
709 710	611 606	2.54	2.82	720 721	609 605	2.73	2.93
711	607	2.12		722	606	2.79	3.02
	A	verage of	nine rows	5		2.62	2.97

TABLE 88.—SEVENTH GENERATION LOW OIL PLOT RECORD 1903

*Sample destroyed

TABLE 89 .- OIL IN NINETY INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1903

Annual ear No.	Oil; percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
В	y Dam	708	E	By Dam	713	B	y Dam	719
1 2 3 4 5 6 7 8 9 10	3.26 3.12 2.92 3.04 2.96 2.83 2.95 3.04 3.22 2.62	816	31 32 33 34 35 36 37 38 39 40	3.19 2.86 2.82 3.31 3.20 3.26 3.21 3.12 3.01 3.03	801 807 820	71 72 73 74 75 76 77 78 79 80	3.14 3.18 2.66 2.51 2.77 3.26 3.47 3.31 3.56 3.01	821 812 808 803
В	y Dam	709	E	By Dam	714	B	y Dam ;	720
11 12 13 14 15 16 17 18 19 20	2.78 2.93 3.38 3.10 2.93 2.73 3.13 2.81 2.68 2.89		41 42 43 44 45 46 47 48 49 50	(No an	s spoiled) alyses) ade	81 82 83 84 85 86 87 88 88 89 90	$\begin{array}{c} 3.19\\ 3.33\\ 2.99\\ 2.91\\ 2.96\\ 2.85\\ 3.02\\ 2.71\\ 2.71\\ 3.32 \end{array}$	822 805 · 818 802 810
В	y Dam	712	B	y Dam	716	B	y Dam	722
21 22 23 24 25 26 27 28 29 30	2.71 2.94 2.74 2.85 2.81 2.87 2.93 2.84 3.28 3.03		51 52 53 54 55 56 57 58 59 60	2.98 2.83 2.66 3.39 3.31 2.88 2.78 3.18 3.28 2.75	814 817	91 92 93 94 95 96 97 98 99 100	$\begin{array}{c} 3.02\\ 3.37\\ 3.38\\ 3.06\\ 2.72\\ 2.81\\ 2.33\\ 2.92\\ 2.72\\ 2.97\\ 2.97\\ 2.97\end{array}$	804 813 819 811 815 809
			В	y Dam	718	<i>v</i>		
			61 62 63 64 65 66 67 68 69 70	$\begin{array}{c} 2.62 \\ 2.96 \\ 3.17 \\ 3.21 \\ 2.91 \\ 2.94 \\ 3.00 \\ 2.92 \\ 2.99 \\ 2.86 \end{array}$	806			

[September,

Register	By Dam	Oil, pe	rcent.	Register	By Dam	Oil, p	ercent.
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.	No.	Seed ear planted.	Crophar- vested.
801	713	3.19		812	719	2.66	2.82
802	720	3.02		813	722	2.72	
803	719	3.01	,	814	716	2.78	3.05
804	722	3.02	3.08	815	722	2.92	2.88
805	720	2.99		816	708	2.92	2.84
806	718	2.92	2.84	817	7.16	3.18	
807	713	2.82	2.88	818	720	2.96	2.99
808	719	2.77		819	722	2.81	
809	722	2.72		820	713	3.03	
810	720	2.71	2.93	821	719	3.14	
811	722	2.33	2.60	822	720	3.19	
Ave	erage of t	en selecte	d rows			2.80	2.89

TABLE 90.-EIGHTH GENERATION LOW OIL PLOT RECORD 1904

- 1

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Annual ear No.	Oil. percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
E	By Dam	804	E	By Dam	810	E	By Dam	815
1 2 3 4 5 6 7 8 9 10	3.10 3.05 3.43 3.15 3.30 3.26 2.96 3.31 2.83	906	31 32 33 34 35 36 37 38 39 40	3.09 2.57 2.69 3.18 2.97 2.66 2.94 2.76 2.90 2.90	912 921	71° 72 73 74 75 76 77 78 79 80	3.29 2.65 2.47 2.87 2.78 3.28 3.14 3.33 2.69 2.99	924 920 913
	By Dam			By Dam	811		By Dam	816
11 12 13 14 15 16 17 18 19 20	2.98 2.82 2.93 2.83 2.84 2.79 2.84 2.83 3.03 2.69	901 908 915	41 42 43 44 45 46 46 47 48 49 50	2.37 2.78 2.40 2.79 2.74 2.66 2.67 2.52 2.53 2.34	902 914 917	81 82 83 84 85 86 87 88 88 89 90	3.15 2.95 2.95 2.63 3.07 3.44 3.07 2.74 2.96 2.84	905 922
1	By Dam	807		By Dam	812		By Dam	818
21 • 22 23 24 25 26 27 28 29 30	2.83 2.83 2.94 3.02 2.67 2.75 2.83 3.03 3.24 2.53	904 910 919	51 52 53 54 55 56 57 58 59 60	2.93 2.91 2.86 2.96 2.74 3.10 2.85 2.93 2.74 3.02	907 918 925	91 92 93 94 95 96 97 98 99 100	2.69 2.98 3.10 3.17 2.49 2.65 3.09 3.00 2.80 3.15	903 916 923
				By Dam	814			
			61 62 63 64 65 66 67 68 69 70	$\begin{array}{c} 3.23 \\ 3.07 \\ 2.67 \\ 3.14 \\ 3.41 \\ 3.27 \\ 2.68 \\ 3.47 \\ 2.86 \\ 3.12 \end{array}$	909	•		

TABLE 91 .- OIL IN ONE HUNDRED INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1904

BULLETIN NO. 128. [September,

Register	By Dam	Oil, p	ercent.	Register	By Dam	Oil, p	ercent.
ear No.	No.	Seed ear planted.	Crophar- vested.	ear No.	No.	Seed ear planted.	Crophar- vested.
901 902 903 904 905 906 907 908 909 910 911 912 913	806 811 818 807 816 804 812 806 814 807 804 810 815	$\begin{array}{c} 2.83\\ 2.40\\ 2.69\\ 2.67\\ 2.63\\ 2.70\\ 2.86\\ 2.84\\ 2.67\\ 2.75\\ 2.83\\ 2.69\\ 2.69\\ 2.69\end{array}$	2.60 2.64 2.48	914 915 916 917 918 919 920 921 922 923 923 924 925	811 806 818 811 812 807 815 810 816 818 815 812	$\begin{array}{c} 2.53\\ 2.69\\ 2.49\\ 2.34\\ 2.74\\ 2.53\\ 2.47\\ 2.66\\ 2.74\\ 2.65\\ 2.65\\ 2.74\\ \end{array}$	2.52 2.69 2.57
	Aver	age of six	selected	rows	I	2.67	2.58

TABLE 92.—NINTH GENERATION LOW OIL PLOT RECORD, 1905 .

1908.] TEN GENERATIONS OF CORN BREEDING.

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
В	y Dam	906	B	y Dam	910	B	y Dam	918
1 2 3 4 5 6 7 8 9 10 11 12 13	$\begin{array}{c} 2.51\\ 2.93\\ 2.35\\ 2.25\\ 2.78\\ 2.35\\ 1.97\\ 2.92\\ 2.41\\ 2.75\\ 2.56\\ 2.95\\ 2.42\end{array}$	1002 1014 1007 1019	41 42 43 44 45 46 47 48 49 50 51 51 52 53	2.30 3.04 2.33 2.62 2.41 2.77 2.52 2.50 2.74 2.10 2.43 2.82 2.22	1011	81 82 83 84 85 86 87 88 89 90 91 92 93	$\begin{array}{c} 2.84\\ 3.02\\ 2.53\\ 2.57\\ 3.06\\ 2.24\\ 2.42\\ 3.02\\ 3.14\\ 2.37\\ 2.50\\ 2.32\\ 2.58\end{array}$	1010 1003 1015 1022
14 15 16 17 18 19 20	2.87 2.89 2.76 2.86 2.43 2.60 2.43 <i>2</i> ,43		54 55 56 57 58 59 60	1.77 3.09 2.44 2.37 .2.31 2.58 2.26 <i>By Dam</i>	1018	94 95 96 97 98 99 100	2.46 2.71 2.66 2.72 2.96 2.83 2.75 <i>y Dam</i>	
21	2.51	908	61	2.48	914 	101	2.61	920
22 23 24 25	2.51 2.94 3.07 2.80		62 63 64 65	2.80 2.73 2.63 2.93		102 103 · 104 105	$2.71 \\ 2.99 \\ 2.63 \\ 2.66$	
26 27 28 29 30	$2.58 \\ 2.01 \\ 2.75 \\ 2.92 \\ 2.52$	1004	66 67 68 69 70	2.24 2.77 2.80 2.36 2.56	1001	106 107 108 109 110	2.31 2.45 2.86 2.74 2.80	1005
31 32 33 34 35	2.24 2.68 2.85 2.69 2.45	1016	71 72 73 74 75	$2.47 \\ 2.23 \\ 2.24 \\ 2.42 \\ 2.64$	1008 1020	110 111 112 113 114 115	$2.30 \\ 2.40 \\ 2.26 \\ 2.26 \\ 2.24 \\ 2.50$	1017 1012
36 37 38 39 40	2.92 2.43 2.55 2.40 2.95	1009 1021	76 77 78 79 80	$ \begin{array}{r} 2.04 \\ 1.99 \\ 2.67 \\ 2.39 \\ 2.60 \\ 2.41 \\ \end{array} $	1013	116 116 117 118 119 120	2.30 2.89 2.40 2.56 2.51	1024

TABLE 93.-OIL IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1905

[September,

Peristan	By Dam	Oil, pe	ercent.	Pagiator	By Dam		ercent.
ear No.	No.	Seed ear planted.	Crophar- vested.		No.	Seed ear planted.	Crophar vested.
1001 1002	914 906	2.36 2.35	2.79	1013 1014	914 906	2.39 2.35	2.76
1003 1004 1005	918 908 920	$2.42 \\ 2.01 \\ 2.45$		1015 1016 1017	918 908 920	2.37 2.24 2.40	2.60
1006 1007 1008	910 906 914	2.22 2.41 2.23	2.71	1018 1019 1020	910 906 914	1.77 2.42 2.24	2.46
1009 1010	908 918	2.43 2.24		-1021 1022	908 918	2.40 2.32	2.02
1011 1012	910 920	2.30 2.26		1023 1024	910 920	2.26 2.40	
	Avera	age of six	selected	rows		2.20	2.66

TABLE 94.—TENTH GENERATION LOW OIL PLOT RECORD 1906

TEN GENERATIONS OF CORN BREEDING.

Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.	Annual ear No.	Oil, percent.	Register No. assigned.
B	y Dam	002	B	y Dam.	1014	By	Dam 1	018
1 2 3 4 5 6 7 8	2.88 2.22 2.05 2.70 2.88 2.69 2.71 2.42	1102 1114	41 42 43 44 45 46 47 48	2.96 2.76 2.77 2.66 2.82 2.05 2.28 3.17	1106	81 82 83 84 85 86 87 88	2.26 2.38 2.40 1.60 2.43 3.17 2.36 2.57	1110
9 10 11 12 13 14 15 16 17 18 19 20	$\begin{array}{c} 2 & 98 \\ 2 & 98 \\ 2 & 98 \\ 2 & 65 \\ 2 & 88 \\ 3 & 18 \\ 3 & 16 \\ 3 & 21 \\ 2 & 93 \\ 2 & 79 \\ 2 & 76 \\ 2 & 77 \\ 3 & 00 \end{array}$		49 50 51 52 53 54 55 56 57 58 59 60	$\begin{array}{c} 2.87\\ 2.67\\ 2.80\\ 2.97\\ 3.03\\ 2.88\\ 2.43\\ 2.43\\ 2.43\\ 2.45\\ 2.56\\ 3.10\\ 3.54 \end{array}$	1118 1111 1123	89 90 91 92 93 94 95 96 97 98 99 99 100	$\begin{array}{c} 2.35\\ 3.22\\ 2.39\\ 2.98\\ 2.47\\ 2.23\\ 2.52\\ 2.41\\ 2.59\\ 2.48\\ 2.34\\ 2.10\\ \end{array}$	1103 1115 1122
B	y Dam	1006		y Dam	1016	Bj	Dam 1	020
21 22 23 24 25	$\begin{array}{c} 2.70 \\ 2.68 \\ 2.40 \\ 3.01 \\ 2.63 \\ 2.44 \end{array}$	1109	61 62 63 64 65	2.74 2.67 2.79 2.87 2.34	1108	101 102 103 104 105	$\begin{vmatrix} 2.52 \\ 2.44 \\ 2.35 \\ 2.60 \\ 3.14 \\ 9.5 \end{vmatrix}$	1105
26 27 28 29 30 31 32	2.34 2.49 2.86 2.93 3.13 2.82 2.78	1104 1121	66 67 68 69 70 71 • 72	2.45 2.62 2.72 2.77 2.55 2.91 2.68		106 107 108 109 110 111 112	2.85 2.21 3.15 2.67 2.91 2.50 2.38	1112
33 34 35 36 37 38 39 40	$\begin{array}{c} 2.71 \\ 2.71 \\ 2.72 \\ 2.15 \\ 2.73 \\ 2.53 \\ 2.87 \\ 3.01 \end{array}$	1116	73 74 75 76 77 78 79 80	$\begin{array}{c} 2.82 \\ 2.45 \\ 2.97 \\ 2.34 \\ 2.50 \\ 2.54 \\ 2.35 \\ 2.54 \end{array}$	1101 1120 1113	112 113 114 115 116 117 118 119 120	$\begin{array}{c} 2.38\\ 2.59\\ 2.61\\ 2.45\\ 2.62\\ 2.22\\ 3.28\\ 2.78\\ 2.10\end{array}$	1124

TABLE 95.—OIL IN ONE HUNDRED TWENTY INDIVIDUAL EARS FROM LOW-OIL PLOT OF 1906

1908.]

[September,

	I	High protein	.	Low protein.				
Plot row	19 (L. 19 19)	Protein,	percent.	Register	Protein, percent.			
No.	Register ear No.	Seed ear planted.	Crop har- vested.	ear No.	Seed ear planted.	Crophir- vested.		
1 2 3 4 5	209 212 216 223 224	12.80 13.62 12.72 11.97 11.89	11.24 11.75 12.10 11.65 11.81	205 206 207 208 209	8.84 8.22 8.29 8.88 9.05	$9.72 \\ 11.04 \\ 10.09 \\ 10.89 \\ 10.58$		
Plot	averages	12.60	11.71	1	8.60	10.46		

TABLE 96.—PROTEIN IN CORN PLANTED AND HARVESTED ON MIXED-PROTEIN PLOT IN 1898

 TABLE 97.—PROTEIN IN CORN PLANTED AND HARVESTED ON MIXED-PROTEIN PLOT

 IN 1899

Plot row No.		High protein	1.	Low protein.			
	Register	Protein, percent.		Register	Protein,	percent.	
	ear No.	Seed ear planted.	Crop har- vested.	ear No.	Seed ear planted.	Crop har- vested.	
1 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	$\begin{array}{r} 309\\ 309\\ 310\\ 310\\ 311\\ 311\\ 312\\ 312\\ 313\\ 313\\ 314\\ 315\\ 315\\ 315\\ 316\\ 316\\ 316\\ 317\\ 317\\ \end{array}$	$\begin{array}{c} 13.21\\ 13.21\\ 13.34\\ 13.34\\ 14.05\\ 14.05\\ 14.92\\ 14.92\\ 14.92\\ 14.25\\ 13.46\\ 13.46\\ 13.46\\ 13.25\\ 13.25\\ 13.25\\ 13.25\\ 13.12\\ 13.04\\ 13.04\\ 13.04 \end{array}$	$\begin{array}{c} 12.04\\ 12.07\\ 12.86\\ 12.24\\ 12.70\\ 12.00\\ 12.74\\ 12.86\\ 12.02\\ 12.04\\ 11.33\\ 12.12\\ 11.16\\ 11.39\\ 11.10\\ 11.63\\ 12.09\\ 12.45\\ \end{array}$	303 303 304 304 304 305 306 306 306 306 307 307 308 308 308 311 311 312 312 314 314		$\begin{array}{c} 9.87\\ 10.53\\ 9.39\\ 10.01\\ 9.60\\ 8.74\\ 9.70\\ 9.33\\ 9.36\\ 9.22\\ 9.03\\ 9.06\\ 10.11\\ 9.10\\ 9.40\\ 8.82\\ 9.29\\ 10.00\\ \end{array}$	
Plot a	iverages	13.63	12.05		8.36	9.47	

1908.] TEN GENERATIONS OF CORN BREEDING.

6	I start	ligh proteir	1.	Low protein.			
Plot row	Register	Protein, pcrcent.		Register	Protein, percent.		
No.	ear No.	Seed ear planted.	Crop har- vested	ear No.	Seed ear planted.	Crop har- vested.	
1 2 3 4 5 6 7	408 409 410 411 412 413 414	$13.87 \\ 13.94 \\ 13.97 \\ 14.41 \\ 14.78 \\ 14.53 \\ 14.24$	$9.54 \\ 11.10 \\ 10.32 \\ 11.55 \\ 10.78 \\ 11.87 \\ 10.19$	404 405 406 407 408 409 410	8.08 7.98 7.74 6.66 8.47 7.60	$\begin{array}{c} 8.18\\ 8.36\\ 7.68\\ 7.81\\ 7.57\\ 7.68\\ 8.56\end{array}$	
8 9 10	415 416 417	13.93 13.89 13.89	10.64 10.88 11.18	411 412 413	7.83 8.03 8.18	7.96 7.79 7.88	
Plot averages		14.15	10.81		7.81	7.95	

TABLE 98.—PROTEIN IN CORN PLANTED AND HARVESTED ON MIXED-PROTEIN PLOT IN 1900

[September,

Plot	ow Hill	Protein, percent.		Plot	Hill	Protein, percent.		
row No.		From high-protein seed.	From low-protein seed.	row No.	No.	From high-protein seed.	From low-protein seed.	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2	$\begin{array}{c} 4\\ 6\\ 7\\ 8\\ 9\\ 13\\ 13\\ 14\\ 1\\ 3\\ 4\\ 7\\ 10\\ 11\\ 12\\ 3\\ 5\\ 6\\ 7\\ 8\\ 8\\ 11\\ 12\\ 14\\ 16\\ 8\\ 9\\ 11\\ 14\\ 15\\ 6\\ 7\\ 9\\ 9\\ 10\\ 11\\ 14\\ 15\\ 8\\ 9\\ 10\\ \end{array}$	$\begin{array}{r} 9.65\\ 13.90\\ 12.75\\ 11.51\\ 10.25\\ 11.53\\ 11.89\\ 14.89\\ 12.94\\ 12.73\\ 13.22\\ 10.51\\ 9.89\\ 10.98\\ 14.76\\ 12.83\\ 12.16\\ 12.78\\ 11.92\\ 10.51\\ 9.15\\ 13.77\\ 14.80\\ 13.51\\ 15.18\\ 8.37\\ 13.44\\ 11.79\\ 12.77\\ 12.84\\ 13.21\\ 11.26\\ 13.80\\ 11.18\\ 14.06\\ 12.88\\ 12.68\\ 14.04\\ 12.07\\ 11.12\\ 12.30\\ 14.33\\ 10.84\\ 12.45\\ 9.56\\ 10.77\\ 14.21\\ 15.15\\ 12.05\\ 13.47\\ 9.60\\ \end{array}$	$\begin{array}{c} 12.13\\ 10.50\\ 9.80\\ 9.54\\ 9.79\\ 8.18\\ 8.44\\ 9.98\\ 9.09\\ 10.40\\ 8.27\\ 9.81\\ 7.87\\ 14.71\\ 11.53\\ 10.26\\ 9.22\\ 8.76\\ 9.45\\ 9.88\\ 7.89\\ 10.10\\ 8.99\\ 11.05\\ 9.22\\ 8.76\\ 9.45\\ 9.88\\ 7.89\\ 10.10\\ 8.99\\ 11.05\\ 9.51\\ 9.63\\ 10.17\\ 8.53\\ 10.17\\ 8.53\\ 10.17\\ 8.53\\ 10.17\\ 8.53\\ 11.21\\ 9.78\\ 9.88\\ 7.91\\ 8.33\\ 10.42\\ 10.38\\ 9.28\\ 11.73\\ 9.07\\ 9.88\\ 8.07\\ 7.94\\ 8.82\\ 9.86\\ 8.58\\ 9.35\\ 8.92\\ 9.51\\ 12.01\\ 9.52\\ 8.51\\ 8.77\\ \end{array}$	$\begin{array}{c} 8\\ 8\\ 9\\ 9\\ 9\\ 9\\ 9\\ 9\\ 9\\ 9\\ 9\\ 9\\ 9\\ 9\\ 9\\$	$\begin{array}{c} 15\\ 16\\ 7\\ 9\\ 10\\ 10\\ 11\\ 13\\ 14\\ 15\\ 15\\ 16\\ 2\\ 3\\ 7\\ 9\\ 10\\ 13\\ 14\\ 15\\ 15\\ 2\\ 5\\ 6\\ 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 1\\ 5\\ 7\\ 8\\ 8\\ 9\\ 11\\ 13\\ 15\\ 16\\ 3\\ 7\\ 8\\ 9\\ 9\\ 11\\ 15\\ 16\\ 4\\ 7\end{array}$	$\begin{array}{c} 13.86\\ 14.41\\ 10.89\\ 12.03\\ 10.07\\ 14.25\\ 11.26\\ 13.62\\ 12.35\\ 10.34\\ 14.03\\ 10.45\\ 12.49\\ 12.40\\ 11.15\\ 10.74\\ 11.48\\ 13.50\\ 12.26\\ 13.30\\ 11.88\\ 9.58\\ 11.77\\ 9.98\\ 9.76\\ 10.58\\ 12.55\\ 11.38\\ 12.09\\ 11.48\\ 12.86\\ 11.95\\ 12.05\\ 12.23\\ 12.25\\ 13.29\\ 8.93\\ 11.66\\ 12.72\\ 11.47\\ 10.59\\ 11.67\\ 10.66\\ 11.47\\ 8.27\\ 11.22\\ 10.21\\ 12.41\\ 12.43\\ 12.35\\ \end{array}$	$\begin{array}{r} 9.76\\ 9.73\\ 7.48\\ 11.54\\ 8.56\\ 7.35\\ 8.92\\ 8.21\\ 7.33\\ 7.71\\ 9.38\\ 14.03\\ 7.75\\ 13.32\\ 7.62\\ 7.64\\ 9.14\\ 11.86\\ 8.22\\ 9.27\\ 8.27\\ 8.27\\ 8.27\\ 8.27\\ 8.78\\ 9.92\\ 10.61\\ 7.25\\ 7.81\\ 9.57\\ 8.75\\ 9.26\\ 9.43\\ 7.57\\ 9.83\\ 11.07\\ 8.81\\ 8.45\\ 8.72\\ 8.09\\ 8.41\\ 8.08\\ 7.83\\ 9.85\\ 10.91\\ 9.11\\ 11.25\\ 7.74\\ 8.17\\ 10.05\\ 9.19\\ 11.28\\ 8.26\\ 9.52\\ \end{array}$	

TABLE 99.—PROTEIN IN ONE HUNDRED THIRTY-SEVEN PAIRS OF EARS GROWN ON MIXED-PROTEIN PLOT IN 1899

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•

1908.]

Plot Hill		Protein,	Plot	Hill	Protein, percent.		
row No.	No.	From' higb.protein seed.	From low protein secd.	row No.	No	From high-protein seed.	From low-protein seed.
14	11	11.32	9 09	16	15	11.77	9 92
14	12	9.37	9.08	16	16	12 18	9 51
14	13	10.21	8.36	17	1	10.73	9.99
14	13	11.18	8.25	17	7	10 29	9.71
14	15	12.56	9.46	17	7	12.11	8.92
14	16	10 96	9.94	17	8	12.69	8.12
15	3 7	10.96	8.65	17	10	13.00	9.114
15		11.76	8 91	17	12	12.48	8.85
15	9	9.18	7.74	17	14	12.05	11.00
15	12	11 67	9.68	17	15	13.01	7.57
15	15	11.12	12.48	17	16	12.54	9.45
16	7	12.51	9.32	18	4	14.14	11.17
16	9	11.11	9.06	18	9	11.73	10.84
16	11	11.50	8.39	18	10	14.19	9.66
16	12	10 93	7.45	18	12	9 28	8.51
16	13	12.20	7.46	18	16	13.44	10.35
16	14	10.26	8.15			1	
		Ave	11.92	9.34			

TABLE 99.—Continued.

TABLE 100 .- OIL IN CORN PLANTED AND HARVESTED ON MIXED-OIL PLOT IN 1898

		High oil.	-	Low oil.			
Plot row	Register	Oil; percent.		Register	Oil, percent.		
No.	ear No.	Seed ear planted.	Crop har- vested.	ear No.	Seed ear planted.	Crop har- vested.	
1 2 3 4 5	207 210 212 213 215 ot averages	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		205 206 207 208 209	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		

[September,

	-	High oil.	•	Low oil.			
Plot row	Register	Oil, pe	ercent.	Register	Oil, percent.		
No.	ear No.	Seed ear planted.	Crop har- vested.	ear No.	Seed ear planted.	Crop har- vested.	
1 2 3 4 5 6 7 8 9 10	305 305 306 307 307 308 308 308 309 309	$\begin{array}{c} 6.47 \\ 6.47 \\ 6.71 \\ 6.71 \\ 6.49 \\ 6.49 \\ 6.34 \\ 6.34 \\ 6.09 \\ 6.09 \end{array}$	5.09 5.08 5.27 5.09 5.03 5.33 5.04 5.44 5.07 5.37	304 304 308 308 310 310 311 311 311 315 315	3.56 3.56 3.22 3.33 3.33 3.33 3.35 3.35 3.64 3.64	3.81 3.92 3.89 3.83 3.73 3.85 3.72 3.76 3.95 3.88	
Plot averages		6.42	5.18		3.42	3.83	

TABLE IOI .- OIL IN CORN PLANTED AND HARVESTED ON MIXED-OIL PLOT IN 1899

TABLE 102.-OIL IN CORN PLANTED AND HARVESTED ON MIXED-OIL PLOT IN 1900

		High oil.		Low oil.			
Plot row	Register ear No.	Oil, percent.		Register	Oil, percent.		
No.		Seed ear planted.	Crop har- vested.	ear No.	Seed ear planted.	Crop har- vested.	
1 2 3 4 5 6 7 8 9	402 403 404 405 406 407 408 409 410	$\begin{array}{c} 6.21 \\ 6.22 \\ 6.35 \\ 6.42 \\ 6.54 \\ 6.43 \\ 6.33 \\ 6.27 \\ 6.22 \end{array}$	5.61 5.74 5.88 5.99 5.71 5.91 5.60 5.84 5.68	404 405 406 407 408 409 410 411 412	$\begin{array}{c} 3.45\\ 3.42\\ 3.31\\ 3.08\\ 2.81\\ 2.94\\ 3.14\\ 3.32\\ 3.41 \end{array}$	3.93 3.78 3.73 3.75 3.89 3.80 3.60 3.58 4.22	
10	410	6.20	5.82	413	3.47	3.77	
Plot averages		6.32	5.78		3.24	3.81	

1908.] TEN GENERATIONS OF CORN BREEDING.

		Oil, pe	rcent.	1		r Oil, pe	ercent.
Plot row No.	Hill No.	From high-oil seed.	From low - oil seed.		Hill No.	From high-oil seed.	From low-oil seed.
1 1 1 1 1 1 1 1 1 1 1 1 1 1	$\begin{array}{c} 6\\ 8\\ 9\\ 10\\ 12\\ 14\\ 15\\ 16\\ 1\\ 3\\ 4\\ 6\\ 8\\ 9\\ 10\\ 11\\ 12\\ 12\\ 15\\ 16\\ 3\\ 4\\ 8\\ 9\\ 9\\ 10\\ 11\\ 12\\ 13\\ 2\\ 3\\ 7\\ 7\\ 11\\ 12\\ 13\\ 13\\ 2\\ 3\\ 5\\ 7\\ 7\\ 9\\ 10\\ 10\\ \end{array}$	5.23 5.31 5.84 5.78 3.46 4.00 6.05 5.96 5.55 5.34 5.29 5.12 5.71 5.17 3.56 5.18 4.51 4.84 5.59 5.28 5.00 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.777 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.77 5.23 5.26 5.777 5.23 5.26 5.285 5.777 5.777 5.777 5.777 5.777 5.777 5.777 5.777 5.777 5.599 5.002 5.205 5.200 5.200 5.205 5.200 5.200 5.200 5.205 5.200 5.200 5.205 5.200 5.200 5.205 5.200 5.20	3,51 3,61 4,06 3,47 4,00 3,81 3.96 4,31 4.27 4.20 4,34 3.66 3.20 3.86 3.20 3.86 4.55 3.93 3.85 3.67 5.24 3.73 3.51 3.16 3.52 3.86 4.55 3.93 3.51 3.16 3.52 3.86 4.55 3.93 3.51 3.16 3.52 3.86 3.52 3.67 3.52 3.86 3.52 3.67 3.52 3.60 3.57 3.53 3.60 3.57 3.52 3.60 3.57 3.53 3.60 3.57 3.60 3.57 3.60 3.57 3.60 3.57 3.60 3.57 3.60 3.67 3.73 3.60 3.67 3.78 3.98	$\begin{array}{c} 5\\ 5\\ 6\\ 6\\ 6\\ 6\\ 6\\ 6\\ 6\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\ 7\\$	$\begin{array}{c} 12\\ 13\\ 1\\ 5\\ 9\\ 9\\ 11\\ 12\\ 12\\ 13\\ 3\\ 5\\ 6\\ 9\\ 10\\ 13\\ 15\\ 2\\ 10\\ 11\\ 12\\ 13\\ 13\\ 14\\ 16\\ 2\\ 4\\ 6\\ 6\\ 8\\ 9\\ 12\\ 12\\ 13\\ 14\\ 4\\ 4\\ 7\\ 7\\ 9\\ 10\\ 12\\ 14\\ 15\\ \end{array}$	$\begin{array}{c} 5.66\\ 4.82\\ 4.40\\ 5.18\\ 5.49\\ 5.59\\ 5.43\\ 5.15\\ 4.91\\ 5.59\\ 5.75\\ 4.51\\ 4.92\\ 5.09\\ 4.74\\ 5.01\\ 5.30\\ 6.29\\ 6.08\\ 5.29\\ 5.66\\ 4.66\\ 5.02\\ 5.53\\ 5.22\\ 4.58\\ 4.97\\ 5.34\\ 4.93\\ 5.66\\ 5.33\\ 5.01\\ 4.65\\ 4.90\\ 5.06\\ 5.67\\ 5.01\\ 5.63\\ 4.80\\ 5.12\\ 5.75\\ 5.95\\ \end{array}$	3.90 3.68 3.82 3.72 5.49 3.33 3.92 3.84 3.67 3.22 3.57 3.30 3.93 3.66 3.93 3.73 3.66 3.93 3.73 3.66 3.93 3.73 3.66 3.93 3.73 3.66 3.93 3.73 3.66 3.93 3.73 3.66 3.92 3.73 3.66 3.93 3.73 3.66 3.93 3.73 3.66 3.93 3.73 3.66 3.93 3.73 3.66 3.93 3.73 3.66 3.92 3.73 3.66 3.93 3.76 4.09 3.28 3.38 4.13 4.06 4.04 3.42 4.09 3.60 3.47 3.68 3.48 3.86 3.54 3.68 4.41 3.77 3.85
		Ave	erages			5.22	3.82

TABLE 103.—OIL IN EIGHTY-FIVE PAIRS OF EARS GROWN ON MIXED-OIL PLOT IN 1899