TEXAS AGRICULTURAL EXPERIMENT STATION

BULLETIN NO. 206 JANUARY, 1917

DIVISION OF POULTRY HUSBANDRY

POULTRY FEED AND FEEDING RESULTS

B. YOUNGBLOOD, DIRECTOR.

COLLEGE STATION, BRAZOS COUNTY, TEXAS.

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BY

R. N. HARVEY, Poultry Husbandman

B. YOUNGBLOOD, DIRECTOR
COLLEGE STATION, BRAZOS COUNTY, TEXAS

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*As of February 1, 1917.
**In cooperation with United States Department of Agriculture.

POULTRY FEEDS AND FEEDING RESULTS.

BY

R. N. HARVEY, Poultry Husbandman.

PART I.

The discussion of feeds is designed to give an idea of the comparative value of the common poultry feedstuffs. It also includes practical methods of feeding, and some rations that have proved satisfactory.

PART II.

A preliminary feed test was carried on for a period of twenty weeks. The results were computed weekly and at the end of each period of four weeks, which gives five periods of four weeks each. Part II consists of the tabulations of the results secured and discussion of the facts shown.

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PART I.

POULTRY FEEDS.

The poultry industry in Texas is increasing very rapidly in magnitude and value. From a minor, unproductive and very much neglected phase of farming, poultry raising is climbing to an important place as a source of income. It is but natural that interest is developed as the value of the industry increases and with this progress comes a demand for more information.

One of the most frequently asked questions is, "What should I feed my hens to make them lay?" This question is a pertinent one, the solution of which is a part of the fundamental basis of profitable poultry raising.

Texas, very happily, is so situated that the great problem of feed is reduced to a minimum. Practically all of the required feeds are produced at home. The climatic conditions are such that at some time during the year any of the essential crops can be raised. Necessity compels us to go outside the borders of the State for but very few of the feeds.

It is possible to grow considerable poultry when entire dependence is placed upon the feeds mentioned in Table 1.

TABLE 1. FEEDS PRODUCED IN TEXAS.*

Grains and Ground Feed.	Meat Feeds.	Green Feeds.
Corn	Meat scrap	Sudan grass
Milo	Green cut bone	Bermuda grass
Kafir		Burr clovers
Wheat		Oats
Wheat shorts		Cowpeas
Wheat bran		Alfalfa
Sunflower seed		Rye
Peas		Wheat
Oats		
Cotton seed meal		
Peanut meal		

*Neither corn nor any other grain, no matter how satisfactory, should be fed alone. It becomes monotonous. Variety should be given as a judicious mixture of feeds, not by feeding different feeds at different meals.

The one best grain for poultry, if but one can be fed, is that one which is most economic to use and, more important, the feed most palatable to the hen and greatly relished by her—that chief of energy-producing foods, corn. It seldom becomes necessary to drop corn from the ration on account of price. The corn should be cracked and the fine particles sifted out; the larger ones are fed as a scratch feed. The meal is a very acceptable ingredient for mash feeds and is much used.

Milo is a grain much like the corn in its composition and it is also relished greatly by the fowls. Frequently when corn cannot be secured milo makes a very satisfactory substitute. It is fed whole as a scratch

feed or as meal in the mash. Kafir may be used instead of milo. For feeding purposes they are very much alike.

Wheat is a very desirable feed when combined with corn. It is palatable and has a high nutritive value. It is often overrated, however. It has the advantage of being small so that the fowls must work to get it. It is most valuable from its by-product standpoint. Wheat bran and wheat middlings (shorts) are the most universally used of all mash feeds. They form an integral part of almost every mash used.

Plump oats are good. The word *plump* must be given full consideration. The hull consists chiefly of fiber which poultry cannot digest, and unless the kernel is well developed the oat makes an inferior feed. They add variety to the ration and may be used with satisfactory results.

Sunflower seeds lend a welcome variety to rations. Peas and beans may be used, though the latter may not be palatable. They are not, however, as important as the feeds more commonly used.

Cotton seed meal has a high protein content and is frequently recommended by dealers. The fowls do not appear to relish it and are not eager to get it.

Peanut meal seems to be palatable and much relished. It is usually safe to consider that when fowls show a marked preference for a food, that food is suitable for them and may very well be a part of the ration.

GREEN FEEDS.

There should always be a supply of green feed. It is an essential in conserving the vitality and increasing the production of the flock. It keeps the digestive tract in order and thus insures better production. Flocks receiving green feed have a lower rate of mortality and are able to make a more efficient use of their feed.

The supplying of greed feed presents no serious problem to farmers in Texas. The climate is such that poultry can be allowed to range during the entire year. It is easily possible to keep some kind of green crop growing near the poultry house and thus supply an abundance of succulence. Many crops are admirably adapted to this purpose. Winter burr clover furnishes an abundance of tender, palatable foliage which is very much relished. It is better when sown with oats. Oats sown in February make an excellent crop for spring pasture, and in addition to the succulence this crop affords straw for litter. Rye and wheat also make good green feeds. Alfalfa, where it can be grown, is one of the very best forage crops.

A few other summer feeds are good: cowpeas, Sudan grass, and soybeans. All of these grow rapidly and are nutritious. Fowls appear to prefer Sudan to the cowpeas, provided the former is kept cut short so that the leaves are tender. Sudan grass is capable of giving an excellent crop of litter.

ANIMAL FEEDS.

Frequently people will say: "We always fed our chickens corn, and they did well. No one ever heard about these new-fangled feeds then. The hens seem to have changed."

In one particular they are wrong. The hens have not changed, but conditions have. When wild, under natural conditions, fowls ate seeds, tender green shoots, and insects. The insects supplied an ingredient very necessary to health and egg production. Now, when chickens are reared in large numbers and on limited range, they are unable to supply themselves with this important nutrient, and, consequently, if we are to raise chickens successfully, we must procure some substitute, and chief among these substitutes is meat scrap. The live stock industry of Texas gives us an abundant supply of this highly nutritious meat food. It is the most common meat food used and it can be termed a standard feed among poultrymen.

Green cut bone gives good results, but in warm climates decomposes very rapidly and causes ptomaine poisoning. It is not safe to use unless a fresh supply can be secured each day.

Tankage, dried blood and other forms of meat are not favored by most poultry growers, and general practice is usually a safe one to follow.

Milk is one of the best meat feeds. Often it is considered better than any other form of meat. It pays to feed milk the year round. A few rules must be observed in its use. Keep the dishes clean. Feed in tin pans or earthen jars. Never use galvanized ware, as it is affected by the lactic acid and a poison is formed.

COMMERCIAL FEEDS.

Commercial feeds may be good. It is usually more profitable, however, to purchase the grains and mix them.

MINERALS.

Certain mineral food substances are not found in sufficient abundance in other feeds to supply the hen with the raw material necessary for building the eggs. The lime compound which forms the shell is the one most needed. It may be supplied as lime-rock (granulated), cracked oyster shells or broken egg shells. Usually the oyster shell is preferred.

Many other grains and feeds well adapted to poultry may be found. The most common ones, however, are as a rule the most economical. They are sure to be found on the market and usually at a reasonable price. It should be remembered that however palatable, available and generally desirable a feed may be, no one grain makes a perfect ration. There must be a variety. Moreover, no one feed contains the nutrients in the proportions required by the body of the fowl.

THE RATION.

Each ration should possess certain qualities or characteristics. It is not possible to get an ideal ration, but rations can very closely approach the ideal. Many rations have proved satisfactory when fed under varying conditions.

The following table (Table 2) presents a ration which has been successfully used in Texas:

TABLE 2.

Feed.	Pounds.
Milo	400
Wheat bran	45
Wheat shorts	55
Sour skimmed milk always before the fowls.	

Table 3 shows a suggested ration which should be desirable, but which has never been tested out by this station. There are many other combinations of feeds which are good or even better perhaps than those mentioned.

TABLE 3.

Feed.	Pounds.
Milo	400
Meat scrap	50
Wheat bran	50
Wheat shorts	60
Milo chops	40

The feeds in Tables 2 and 3 are all fed in the same manner. They are balanced to a nutritive ratio 1-4-6.

The whole grains are fed as a scratch feed, morning and night—about one-half as much being fed in the morning as at night. As a rule, they are sown broadcast in the litter, which is then stirred with a fork or rake in order to make the hens work for their feed. The hens should have their crops well filled at night. Whether or not they have had enough can be ascertained by examining the litter. If no particles of grain are found the hens would eat more. If grain is found the hens have had enough. They should be fed early enough so that they could eat all that they required before dark.

The ground feeds are fed as a dry mash in hoppers, which are opened at noon and left open until the hens are fed at night. This, however, should be so adjusted that the grain eaten should weigh twice as much as the mash.

In addition, there should be a good supply of clean green feed. Fresh water should always be before the fowls. Some kind of shell-forming material should be constantly before them in hoppers. All feed should be sweet and clean, free from mould and should never have become sour or heated.

PART II.

THE RESULTS OF A PRELIMINARY TEST OF FEEDS PRODUCED IN TEXAS.

FEEDING EXPERIMENT.

The practical and logical way of solving the feeding problem is in the use of the feeds. Since no one feed is satisfactory when used alone, a combination of feeds is used. When comparisons with other feeds are to be made, then all conditions are made as nearly equal as possible except the feeds which are being tested.

OBJECT.

The object of this experiment was to obtain indications of the comparative feeding values of meat scrap, cotton seed meal and sour skim milk. Meat scrap has long been considered by many to be a valuable source of protein, but it was thought that some of the vegetable feeds with light protein content could be satisfactorily substituted for it. Sour skim milk is being recognized as a very efficient and desirable source of protein. It is available on many farms.

OBSERVATIONS.

On June 12 it was noted that hens of Lot 2 were molting. Lot 3 began molting a little more tardily. Lots 1 and 4 had hens molting on June 24.

TABLE 4. THE FEEDS.

	Pounds.
Lot 1—	
Milo	400
Cotton seed meal	60
Wheat bran	70
Wheat shorts	50
Milo meal	20
Lot 2—	
Milo	400
Meat scrap	45
Wheat bran	50
Wheat shorts	60
Milo meal	45
Lot 3—	
Milo	400
Meat scrap	22.5
Cotton seed meal	30
Wheat bran	50
Wheat shorts	60
Milo meal	20
Lot 4—	
Milo	400
Wheat bran	45
Wheat shorts	55
Skim milk.	

The value of the eggs for the first two weeks was 30 cents a dozen; for the next fourteen weeks, 20 cents a dozen; and the last four weeks, 15 cents a dozen.

All tables have been made on the basis of 100 hens, or one animal unit (A. U.). This is used to prevent disparity in numbers from making a difference in the results. Thus, 34 hens in one flock would not be compared fairly when another flock contained 37 hens. So the data were reduced to give the results for each hen and then multiplied by 100, which gives the results in the terms of animal units.

RATIONS AND FEEDS.

The feeds tested are as follows: Cotton seed meal (Lot 1), meat scrap (Lot 2), cotton seed meal and meat scrap (Lot 3), and sour skim milk (Lot 4).

The data given in Tables 5, 6, 7 and 8 are shown graphically by Figures 1, 2, 3 and 4, respectively. The production per animal unit is presented by Figure 1, which, with the corollary data contained in Figure 2, gives the first step, in the final test, of a ration, the product and its value. Inspection makes it at once apparent that the fowls receiving meat scrap produced well during the first three periods. The hens receiving skim milk did well throughout the whole twenty weeks. The flocks receiving cotton seed meal and cotton seed meal with meat scrap gave very poor results, the former being very low twice, high once, but falling again. The latter was lowest one month, but was next to the lowest all other times.

Since all eggs have the same value, it is obvious that the products will have a corresponding variance or relation. Therefore, this chart has little value in itself, but is chiefly valuable as a stepping stone to the final result.

TABLE 5. PRODUCTION PER ANIMAL UNIT.

Period.	Lot 1. Cotton seed meal.	Lot 2. Meat scrap.	Lot 3. Meat scrap and cotton seed meal.	Lot 4. Sour skim milk.
1. Eggs	1137	1638	1266	1414
2. Eggs	1240	1468	1380	1460
3. Eggs	1560	1533	1469	1494
4. Eggs	1263	1184	1259	1549
5. Eggs	1068	963	1007	1212

TABLE 6. VALUE OF PRODUCT PER ANIMAL UNIT.

Period.	Lot 1. Cotton seed meal.	Lot 2. Meat scrap.	Lot 3. Meat scrap and cotton seed meal	Lot 4. Sour skim milk.
1	$24.52	$34.25	$26.36	$29.95
2	20.61	24.46	22.50	24.32
3	25.93	25.54	24.58	24.90
4	20.89	20.17	20.54	25.90
5	13.57	12.14	12.59	15.19

TABLE 7. COST OF FEED AND LITTER PER ANIMAL UNIT.

Period.	Lot 1.	Lot 2	Lot 3	Lot 4
	Cotton seed meal.	Meat scrap.	Meat scrap and cotton seed meal.	Sour skim milk.
1	$6.14	$7.65	$8.08	$7.85
2	4.90	5.58	5.86	6.18
3	4.90	5.00	5.64	6.61
4	5.34	5.89	6.25	6.34
5	6.26	6.77	7.94	5.74

TABLE 8.

Lot.	Total number eggs produced.	Total value.	Total cost of feed.	Total value of product over cost feed
1	6385	$105.52	$27.54	$77.98
2	6784	116.54	30.89	85.67
3	6381	106.57	33.77	72.80
4	7129	120.26	32.72	87.54

Both sets of data presented are fundamental, but not final. They leave out two all important essentials,—cost (Figure 3) and economic value of the ration, as shown by the profit (Figure 4). It is at once noticeable that Lot 1, which had a low rate of production, cost less to maintain. Lot 2, which had a fairly high rate of production, was next to Lot 1 in the first four periods. Lot 3, which had low production throughout the five periods, has a higher cost line than either Lot 1 or Lot 2, whereas Lot 4 is high in both production and cost.

This leads us to the final and most important result—the economic practical question: Which of these feeds gives the most profit for the money used?

Does the feed which produces most cost so much more that it is not economical to use? Does the feed that costs least produce so few eggs that it cannot be used to advantage? Or is the return constant for the feed used?

It has already been noted that the lot (Lot 4) which received sour milk had a high production, high cost and now it shows well in the profits. In this case, the extra cost of production was not so high as to cause low profits.

The flock receiving meat scrap (Lot 2) had high production and low costs and now has good profits. Lot 3 had low production, high costs and has low profits three out of five months.

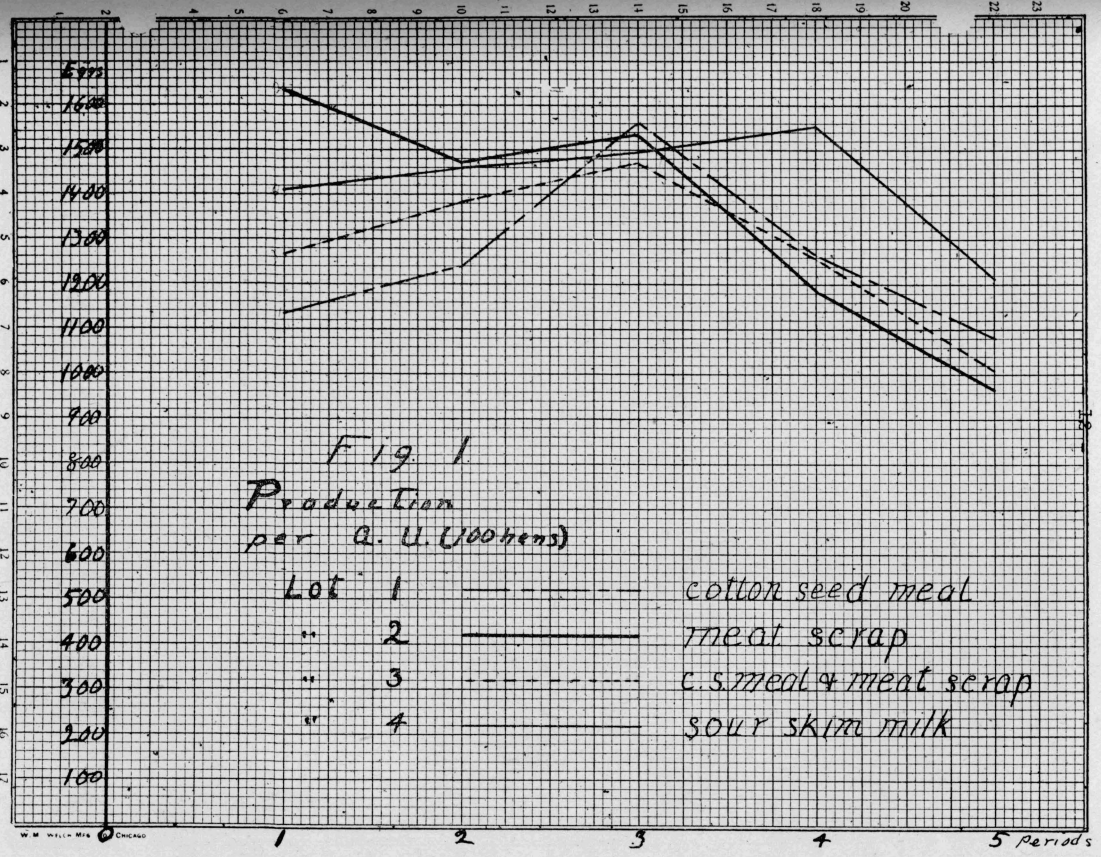
These results, however instructive they may be in showing tendencies and periodic comparisons, do not give quite all the information desired. A summary (Figure 5) of all results presented is required before conclusions can be drawn.

A study of the summary shows that the sour milk-fed flock (Lot 4) had about 350 eggs more than the flock next highest (meat scrap, Lot 2), which was about 300 ahead of the other two lots (cotton seed meal, Lot 1, and cotton seed meal with meat scrap, Lot 3).

This difference is accentuated in the value because each is multiplied by the number. The costs, however, show that there is little difference when all are totaled and compared. Lot 3 has the greatest cost, yet the value of the product is very low. As a result the profits are low. Lot 1 has low production, but it is coupled with low cost, and, therefore, the profit is higher. Lot 2 has greater value of product than either Lot 1 or Lot 3 and a cost midway between the latter flocks. The production is so much greater, however, that its profit column is higher than those of the other three lots. Lot 4 had such high costs that the profit is but little higher than that of Lot 2.

SUMMARY.

1. The results from all lots were satisfactory.
2. Vegetable protein did not form a satisfactory substitute for animal protein.
3. The sour skim milk was the most profitable of the feeds tested.
4. The cotton seed meal ration would have been more satisfactory if the cost had been lower.
5. At the prices paid for feeds, the meat scrap ration was considerably more efficient than the cotton seed meal ration.


1600
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1400
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1100
1000
900
800
700
600
500
400
300
200
100
1
2
3
4
5 Periods
Fig. 1
Production
per A. U. (100 hens)
Lot 1 —— cotton seed meal
" 2 —— meat scrap
" 3 —— C.S. meal & meat scrap
" 4 —— sour skim milk
W. M. WELCH MFG. CHICAGO

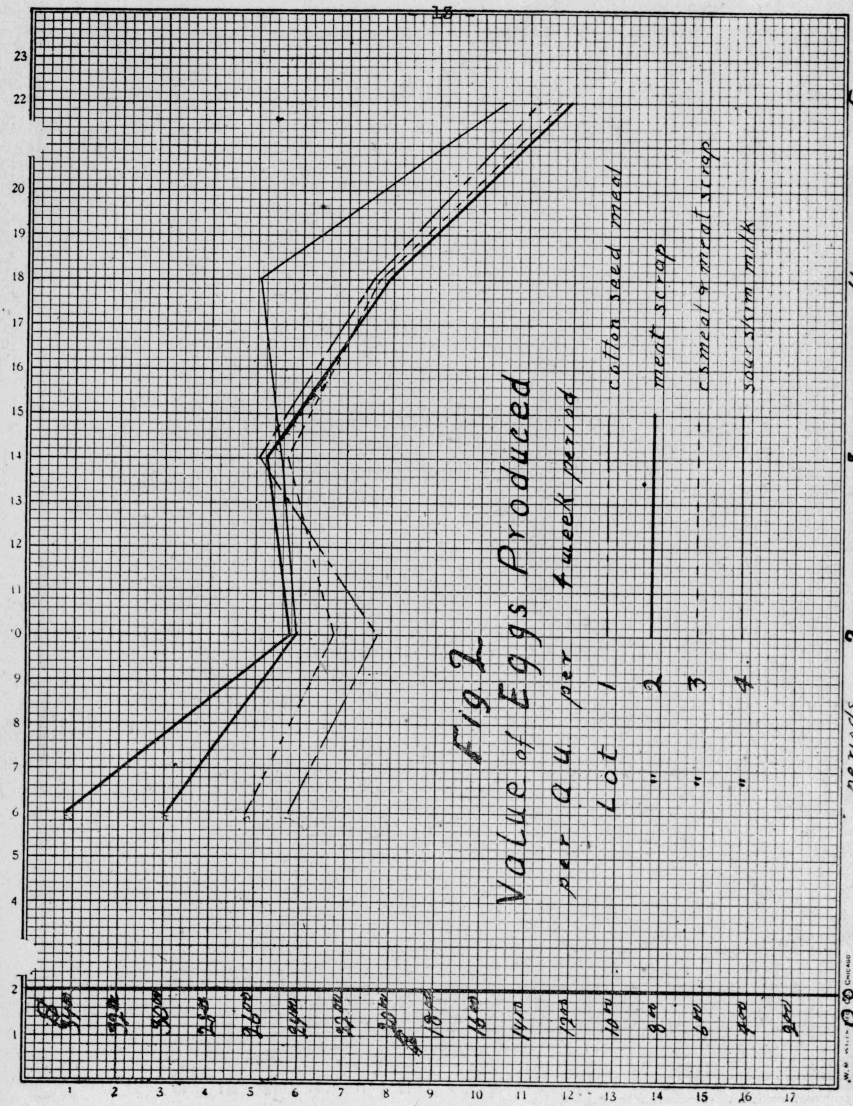
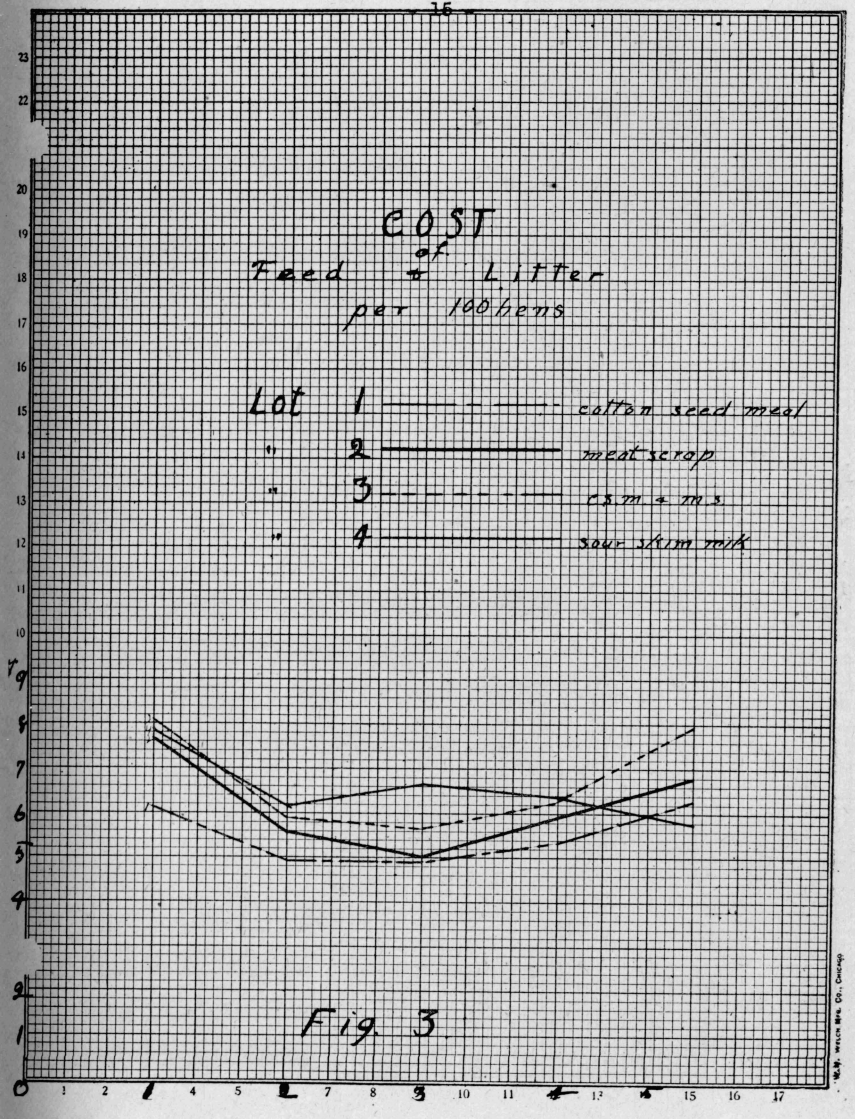


Fig 2
Value of Eggs produced
per 24 per 4 week period
Lot 1 ——— cotton seed meal
" 2 ——— meat scrap
" 3 ——— c.s.meal & meat scrap
" 4 ——— sour skim milk
periods


COST
Feed of Litter
per 100 hens
Lot 1 cotton seed meal
" 2 meat scrap
" 3 c.s.m. + m.s.
" 4 sour skim milk
Fig 3

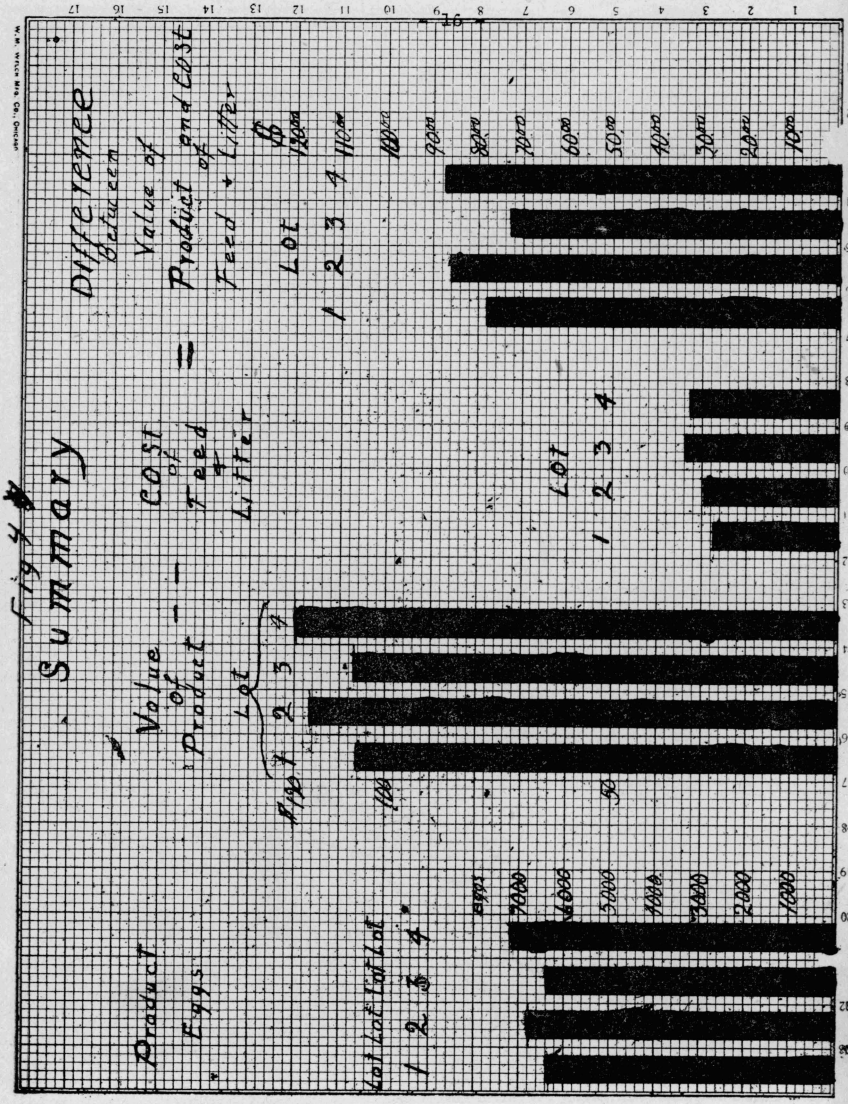


Fig 4
Summary
Difference
Value of Product
Cost of Feed + Litter
Lot 1 2 3 4
Product
Eggs
Lot 1 2 3 4
Value of Product - Cost of Feed + Litter
Lot 1 2 3 4
Lot 1 2 3 4
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