

ALABAMA

Agricultural Experiment Station

OF THE

Alabama Polytechnic Institute

AUBURN

Part I.

**Velvet Beans Compared with Cottonseed Meal
for Fattening Steers**

Part II.

**Velvet Beans, Cottonseed Meal and Corn as
Feeds for Dairy Cattle**

Part III.

**Velvet Bean Pasture Compared with Corn and
Dried Blood; Velvet Bean Meal Compared
with Corn for Fattening Hogs**

By

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and

ERNEST GIBBENS

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VELVET BEANS COMPARED WITH COTTONSEED MEAL FOR FATTENING STEERS

By
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AND
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INTRODUCTION

A crop of velvet beans grown with a crop of corn increases very materially the amount of concentrated feeds and roughage for the live stock on the farm. A very satisfactory method of harvesting the two crops is to gather the corn, after a heavy frost has killed the velvet bean vines, and then turn enough cattle and hogs into the field to consume the beans, the leaves and vines, and a large amount of the corn stover. This method of harvesting the two crops is satisfactory on soils of a sandy or light character which will not be injured by tramping of the stock during wet weather.

A number of farmers who grow velvet beans on a large scale make a practice of gathering the mature beans, after a heavy frost has killed the vines, and then allow the cattle and hogs to gather the immature beans. The mature beans are then used for feed later in the winter, or are sold on the market. The feeding of the velvet beans on the farm is generally preferable to selling them on the market. If the crop is fed to live stock about eighty-five percent of the fertilizer in the crop will be returned to the soil, and the commercial fertilizer bill will be reduced materially. However, this year there is not enough live stock in the section of the state growing velvet beans to consume the crop. The bean crop this year in Alabama is estimated at nearly 2,500,000 acres. As a large amount of the crop must be sold on the market it is very desirable to know how velvet beans as a concentrate compare with some of the common feeds used on the average farm. The experiments reported in this bulletin were planned to answer such questions.

Bulletin No. 192 issued by this Station in November, 1916, gives a report of a feeding test conducted during the winter of 1915-16 to compare the feeding value

of cottonseed meal with velvet beans for fattening steers.

The results of the feeding test for the winter of 1916-17 are not directly comparable to the ones given in Bulletin No. 192, as the steers used the two winters were somewhat different in quality and the beans were prepared in a different way.

OBJECT OF THE EXPERIMENT

This experiment was planned with a view of determining the relative feeding value of velvet beans in the pod and cottonseed meal as the concentrate part of a ration for fattening steers.

The steers were divided into two lots of fifteen each, and were given the following feeds:

LOT 1. Velvet beans in pods. Corn silage.

LOT 2. Cottonseed meal. Corn silage.

THE CATTLE

The steers used in this experiment were grades, showing either Angus, Hereford, or Shorthorn blood. About one-half of the steers were raised on the farm where the experiment was conducted; and the remainder were purchased in Texas in June, shipped to Allenville, and grazed during the summer. They then varied from one to two years in age. The average weight of each animal at the beginning of the test was approximately 773 pounds.

GENERAL PLAN OF THE WORK

The steers were fed under average farm conditions. The feeding test was conducted on the farm of Judge B. M. Allen, at Allenville, Alabama. Judge Allen furnished the cattle and the feeds, and the experiment was planned and carried on under the supervision of the authors of this Bulletin. Mr. Ernest Gibbens had personal charge of the cattle throughout the experiment.

The feed lots were located in a cedar grove. The cedar trees gave all the protection the steers had during the experiment. The lots had a southern exposure and were well drained. The manure was hauled out of the lots every few days. No bedding was used, but the lots were dry enough so the steers could lie down comfortably. Pure water from a deep well was kept before the steers at all times. Rock salt was kept in the feed troughs continually.

The steers were fed twice each day. The concentrates and roughage were mixed thoroughly by hand

in the feed troughs. The amount of feed was regulated so that it was consumed in a few hours. At the close of the test the steers were shipped to the St. Louis market.

PRICE AND CHARACTER OF FEEDS USED

The prices used in this bulletin are the prices actually paid for the steers and the feeds. The corn silage was made on the farm. The silage corn would have yielded twenty-five bushels of corn per acre. All of the feeds were of good quality. The corn silage was bright. The cottonseed meal was fresh, bright, and of a high grade. The velvet beans were well matured and of good quality. The prices of feeds were as follows:

Cottonseed meal	\$38.00 per ton.
Velvet beans in pod	20.00 per ton.
Corn Silage	3.00 per ton.

METHOD OF FEEDING AND HANDLING THE STEERS.

As the pastures began to fail in the fall the steers had the run of the stalk fields. They were in the stalk fields during the month of November. Eighteen days previous to going on the experiment the steers were fed, while in the stalk fields, two pounds of velvet beans and twelve pounds of corn silage per head per day. The preliminary feeding was done to accustom them to feeding and handling and to secure a uniform fill. On December 21st, 1916, the steers were weighed, tagged, and divided into the lots for the test. Each steer was weighed three consecutive days and the average of the three weights used as the initial weight of the steer in the test. Fourteen days later they were weighed by lots, and on the twenty-eighth day individual weights were taken, this procedure being repeated until the end of the test. The experiment continued for 119 days. Hence the steers were fed for 137 days, including the preliminary period.

The following table outlines by twenty-eight day periods the amount of feed given each steer daily:

TABLE I.—*Showing the Average Amount of Feed Consumed Daily Per Steer, December 21, 1916 to April 19, 1917, (119 Days).*

PERIOD	LOT I Velvet beans Corn Silage		LOT II Cottonseed Meal Corn silage	
		Lbs.		Lbs.
1st 28 days	Velvet beans	4.57	Cottonseed meal	1.57
	Corn silage	33.00	Corn silage	37.64
2nd 28 days	Velvet beans	9.43	Cottonseed meal	4.37
	Corn silage	27.46	Corn silage	41.02
3rd 28 days	Velvet beans	13.54	Cottonseed meal	6.78
	Corn silage	24.64	Corn silage	44.00
4th 28 days	Velvet beans	14.00	Cottonseed meal	7.00
	Corn silage	26.00	Corn silage	46.14
Last 7 days	Velvet beans	14.00	Cottonseed meal	7.00
	Corn Silage	26.00	Corn silage	49.19

The beans were fed in the pod and were thoroughly mixed with the silage in the trough so that each steer would get only his share of the beans. After the experiment continued four weeks the beans were soaked in the pod in water for twelve hours previous to being fed. The soaking period softened the pod and seemed to assist the steers in masticating the beans.

The steers in Lot I ate on an average 4.57 pounds of velvet beans and 33 pounds of silage during the first 28 days. The amount of beans was gradually increased until the fourth period when each consumed 14 pounds of velvet beans and 26 pounds of silage. The steers in Lot I did not consume as much silage as the steers in Lot II.

The steers in Lot II ate on an average 1.57 pounds of cottonseed meal and 37.64 pounds of corn silage daily during the first twenty-eight days. The amount of meal was gradually increased until at the close of the experiment each steer was eating 7 pounds of cottonseed meal each day.

Both rations were relished by the steers and at no time during the test was there any trouble due to steers going off feed.

TABLE II.—*Average Weights and Gains December 21 1916 to April 19, 1917, (119 Days).*

LOT	Number of Steers	RATION	Average Initial weight	Av. final weight of each steer	Av. total gain of each steer	Av. daily gain of each steer
I	15	Corn silage	Lbs.	Lbs.	Lbs.	Lbs.
		Velvet beans	773.4	963.73	190.34	1.6
II	15	Corn silage	777.73	963.26	185.51	1.55
		Cottonseed meal				

All the steers in each lot made satisfactory gains, although they were not unusual. The average gains daily, per head, for the 119 days were 1.6 pounds and 1.55 pounds in Lot I and Lot II respectively.

At the close of the test the steers were shipped to the St. Louis market and sold to one of the packing companies. The steers were sold by lots to the buyer for the packing company, the buyer having no knowledge of how the steers were fed. The authors of this bulletin could not gather the data on the carcasses as the packing houses were closed to the public on account of the unusual conditions caused by the war. The packer stated, however, that the carcasses of Lot I (bean fed steers) showed a little better external covering of fat.

QUANTITY AND COST OF FEED REQUIRED TO MAKE ONE HUNDRED POUNDS GAIN

In a feeding operation the real value of a feed, or combinations of feeds, is measured by the number of pounds of feed required to make one hundred pounds of gain in live weight. Table III shows the quantity of feed required to make one hundred pounds of gain and the cost of gains under the conditions of this experiment.

TABLE III.—Quantity and Cost of Feed to Make One Hundred Pounds of Gain, December 21, 1916 to April 19, 1917, (119 Days).

LOT	RATION	Pounds of feed to make 100 lbs. gain	Cost of feed to make 100 lbs. gain
I	Velvet beans in pod	670	\$9.30
	Corn silage	1733	
II	Cottonseed meal	327	\$10.42
	Corn silage	2811	

When the feeds are valued as previously stated it is seen that velvet bean fed steers made the cheapest gains. Lot I, however, consumed only about two-thirds as much silage as did Lot II. It is evident that the pods tended to reduce the consumption of silage. In this test 2.05 pounds of velvet beans in the pod were equal to 1 pound of high grade cottonseed meal. That is, according to this experiment, a feeder could afford to pay nearly half as much per ton for unhulled and unground velvet beans as for a ton of high grade cottonseed meal.

Although the results given in Bulletin No. 192 cannot be compared completely with the results of this experiment, as the cattle were different in quality and the beans were fed dry in the pod, the results will be of interest. In the test of the winter of 1915-16 one pound of cottonseed meal took the place of two and one-half pounds of velvet beans in the pod. The cost per 100 pounds of gain was practically equal when cottonseed meal cost \$35.00 per ton and unhulled velvet beans \$18.00 per ton. In feeding velvet beans in pods with silage it was then found that it was not necessary to grind the beans. The gains made by the steers were satisfactory. Lot 6 (cottonseed meal) gained an average of 1.6 pounds per day; Lot 7 (velvet beans) gained an average of 1.5 pounds per day.

FINANCIAL STATEMENT

The statement for the feeding test is based on the prices the steers actually cost and the local prices for feeds. Steers of the same age and quality, fed under similar conditions, should return the same profits on the same rations. Prices of steers and of feeds vary from year to year, so the feeder must make corrections in his estimate for feeding operations on the basis of local prices.

LOT I.—*Velvet Beans and Corn Silage:*

To 15 steers, 11,601 lbs. at 6c	\$ 696.06
To 19,130 lbs. velvet beans at \$20.00 per ton	191.30
To 49,484 lbs. corn silage at \$3.00 per ton,	74.22
To freight, yardage and commission	49.65
TOTAL EXPENSE	\$1011.23
By sale 15 steers, 13,390 lbs. at \$9.75 per cwt.	1305.52
TOTAL PROFIT	294.29
PROFIT PER STEER	19.62

LOT II.—*Cottonseed Meal and Corn Silage*

To 15 steers at 6c per lb.	\$ 699.96
To 9,120 lbs. cottonseed meal at \$38.00 per ton	173.28
To 76,795 lbs. corn silage at \$3.00 per ton,	115.19
To freight, yardage and commission	49.65
TOTAL EXPENSE	\$1038.08
By sale 15 steers, 13,660 lbs. at \$9.40 per cwt.	1284.04
TOTAL PROFIT	245.96
PROFIT PER STEER	16.39

SUMMARY STATEMENTS

1. The steers used in this test were from one to two years old. They were grade Angus, Hereford, and Shorthorn.

2. At the beginning of test they averaged about 775 pounds.

3. The thirty head of steers were divided into two lots and fed as follows:

LOT I. Velvet beans in the pod. Corn silage.

LOT II. Cottonseed meal. Corn silage.

4. For the 119-day feeding period average daily gains of 1.6 and 1.55 pounds were secured in Lots I and II respectively.

5. It cost \$9.30 and \$10.42 to make 100 pounds of gain in Lots I and II respectively.

6. The steers cost 6c per pound when they were put in the feed lot. At the close of the experiment they were sold in St. Louis. The velvet bean steers sold for \$9.75 per hundred weight, and the cottonseed meal steers for \$9.40 per hundred weight.

7. Each steer in Lot I (velvet beans) netted a clear profit of \$19.62; and Lot II (cottonseed meal), \$16.39.

8. The velvet bean ration was relished by the steers.

9. In this experiment one pound of cottonseed meal took the place of 2.05 pounds of velvet beans in the pod. The velvet bean lot, however, required only approximately two-thirds as much silage as the cottonseed meal lot.

PART II.
VELVET BEANS VERSUS COTTONSEED
MEAL AS FEEDS FOR DAIRY CATTLE

By
GEO. S. TEMPLETON
AND
H. C. FERGUSON

INTRODUCTION

Due to the greatly increased production of velvet beans in recent years dairymen are becoming interested in the crop as a possible means of furnishing an economical home grown concentrate. The bean crop is nearly always planted with a crop of corn. With apparently no injury to the corn crop they will yield from one-half to one ton of beans to the acre, besides making a heavy vine growth. Henry and Morrison in "Feeds and Feeding," give them the following value in digestible nutrients per one hundred pounds, compared with corn and cottonseed meal:

	Protein	Carbohydrates	Fat
Velvet bean, seed	18.1	50.8	5.3
Velvet bean, seed and pod	14.9	51.7	3.8
Good cottonseed meal	31.6	25.6	7.8
Dent Corn	7.5	67.8	4.6

It will be seen from the above that velvet beans contain more digestible carbohydrates and less protein and fat than good cottonseed meal, but more protein and less carbohydrates than dent corn, while the hulled beans contain more fat and the unhulled beans less fat than corn. With these facts in mind the following experiments were planned to determine their actual feeding value for dairy cattle.

EXPERIMENT A

OBJECTS OF EXPERIMENT

The objects of this experiment, made in the winter of 1915-16, were to determine the relative value of velvet beans and pods as compared with a mixture of seven parts corn meal and eight parts cottonseed meal, as influencing:

1. The production of milk.
2. The production of butterfat.
3. The feed cost of milk and butterfat.

4. The weight of cows in milk.

The cows used were pure bred Jerseys of only average productive ability. In selecting them attention was paid to the milk flow, length of time in milk, size, and age.

PLAN OF THE EXPERIMENT

Two lots of five cows each were used in the experiment. They were fed during a fourteen day preliminary period to accustom them to the rations. They were then fed for a twenty-eight day test period as follows:

LOT I received a mixture of corn meal, 7 parts, and high grade cottonseed meal, 8 parts, with corn silage

LOT II received velvet beans and pods, ground, and corn silage.

At the close of this period seven days were used to reverse the rations of the two lots.

For the second twenty-eight day test period they were fed as follows:

LOT I received velvet beans and pods, ground, and silage.

LOT II received a mixture of corn meal, 7 parts, and high grade cottonseed meal, 8 parts, with silage.

FEEDS USED

The feeds used were all of good quality. The shelled corn was ground into a coarse meal. The beans in the pods were found to be approximately one-third pods and two-thirds beans by weight, and were fed on the basis of the shelled beans—that is, one and one-half pounds of beans and pods were considered to be the equivalent of one pound of beans.

The mixture of corn meal and cottonseed meal was fed at the rate of one pound for each two and one-half pounds of milk produced, while the beans and pods were fed at the rate of one and one-half pounds for each two and one-half pounds of milk produced, as explained before. The silage was made of corn cut in the dent stage. Silage was the only roughage used and the cows were given all they would consume. Water was kept before the cows at all times and salt was given them at regular intervals. Cottonseed meal or a mixture of corn meal and cottonseed meal is generally used in this section for the concentrate part of a ration for dairy cows. It was the desire to make a com-

parison between the velvet beans and a mixture of the other two feeds, and still have the cottonseed meal predominate in the latter. Hence the proportion of seven parts corn meal to eight parts cottonseed meal. The prices of the feeds were as follows:

Cottonseed meal	\$38.00 per ton
Corn85 per bu.
Velvet beans in pods	18.00 per ton
Silage	2.50 per ton

METHOD OF FEEDING AND HANDLING THE COWS

Throughout the experiment the cows were confined to a small wooded lot so that the only feed they received was that given them. They were put in the Station barn morning and evening at regular intervals for feeding and milking. The cows were weighed every two weeks during each test period. The rations of the two lots were reversed at the close of the first period to eliminate the effects of individual variation between the two lots.

TABLE NO. I.—*Showing Total Amount of Feed Consumed and Amount of Milk and Butterfat Produced. - (56 Days).*

Concentrates	Grain	Silage	Milk produced	Butterfat produced
	Lbs.	Lbs.	Lbs.	Lbs.
Velvet beans in pods	2054.8	10301.7	4753.5	229.40
Corn meal, 7 parts	1124.0	10813.7	5243.1	267.49
Cot'ns'd meal, 8 pts.	1284.3			

Table I shows that more feed was consumed by the cows while on the cottonseed meal and corn ration, and that more milk was produced by that feed. The beans were first fed in the pod with no preparation, but the cows did not seem to relish them in this form. They were then ground into a coarse meal, but even with this treatment the results were not altogether satisfactory, as none of the cows relished the beans sufficiently to consume their entire ration. However, some of the cows seemed to develop a liking for the beans towards the close of the experiment. A great deal of difference was observed between individual cows in this respect. The maximum consumption was eleven pounds per day, while the minimum consumption was nearly four pounds per day, per cow. The cows consuming a heavy ration kept up their milk flow as well on the beans as on the cottonseed meal mixture.

TABLE NO. II.—*Showing the Amount of Feed Required for, and Feed Cost of, 100 Lbs. of Milk and 1 Lb. of Butterfat.*

Concentrates	100 Lbs. Milk			1 Lb. Butterfat		
	Grain	Silage	Cost	Grain	Silage	Cost
Velvet beans in pods	Lbs. 43.2	Lbs. 216.7	.66	Lbs. 8.9	Lbs. 44.9	.13
Corn meal, 7 parts Cot'n's'd meal, 8 pts.	21.4 24.4	208.1	1.05	4.2 4.8	40.4	.205

The above table shows that it required practically the same amount of ground velvet beans and pods to produce one hundred pounds of milk and one pound of butterfat as it did of the mixture of corn meal and cottonseed meal. It is also shown that the feed cost is cheaper in each case with the velvet bean and pod ration. However, Table I shows that the production of milk is 10 per cent. greater and butterfat 16 per cent. greater with the grain mixture. Table III, following, shows that the cows eating the velvet bean and pod ration lost an average of 2.9 pounds per cow during the 56 days, while those eating the mixture gained 24.6 pounds per cow.

TABLE NO. III.—*Showing the Influence of the Two Rations on the Weights of the Cows. (56 Days).*

Concentrates	Av. weight at beginning	Av. weight at close	Average gain	Average loss
Velvet beans in pods	796.2 lbs.	793.3 lbs.		2.9 lbs.
Corn meal and Cottonseed meal	796.8 lbs.	821.4 lbs.	24.6 lbs.	

The above table shows that the grain mixture was more efficient for maintaining the weight of dairy cows in milk than a ration of ground velvet beans and pods. However, observation and figures on the individual cows show that in the instances where the velvet beans were nearly all consumed the weights were maintained and some of the cows gained in weight.

SUMMARY.

1. A grain ration of 7 parts corn meal mixed with 8 parts cottonseed meal, fed with corn silage, produced more milk and butterfat than ground velvet beans in pods with silage.

2. The velvet bean ration produced milk and butterfat at a lower cost than the corn meal and cottonseed meal mixture.

3. The velvet bean ration did not maintain the weights of the cows as well as the corn and cottonseed meal mixture.

4. The velvet beans and pods were not relished by most of the cows, whether unprepared or ground to a meal.

5. Wide variations were observed as to the palatability of the velvet bean ration with the different cows. The maximum consumption was eleven pounds per cow, per day, and the minimum consumption was nearly four pounds per head, per day.

6. Individual cows consuming a heavy ration of velvet beans maintained their milk flow and body weight.

EXPERIMENT B

OBJECTS OF THE EXPERIMENT (Winter 1916-17).

1. A comparison of velvet bean and pod meal versus cottonseed meal as a supplement to corn for milk and butterfat production.

2. Influence of velvet bean and pod meal versus cottonseed meal as a supplement to corn on the cost of producing milk and butterfat.

3. Efficiency of velvet bean and pod meal versus cottonseed meal as a supplement to corn in maintaining the weights of cows in milk.

COWS USED

The cows used were pure bred Jerseys of only average productive ability. Length of time in milk, amount of milk flow, size, and age were determining factors in the selection of the two lots.

PLAN OF THE EXPERIMENT

Two lots of four cows each were used in this experiment. A preliminary period of seven days was taken to accustom them to the rations. They were then fed for twenty-eight days on the following rations:

LOT I received a mixture of 4 parts corn meal and 6 parts velvet bean and pod meal, and corn silage.

LOT II received a mixture of 4 parts corn meal and 3 parts high grade cottonseed meal, and corn silage.

At the close of the first period a seven day period was taken in which to reverse the rations of the two lots.

For a second twenty-eight day period Lot I received a ration of corn meal, 4 parts, and cottonseed meal, 3 parts, with corn silage, while Lot II received corn meal, 4 parts, and velvet bean meal, 6 parts, with corn silage.

FEEDS USED

All of the feeds used were of good quality. The corn was ground into a coarse meal as in the previous year. The beans in the pods were also ground into a coarse meal. The cottonseed meal was a good grade of meal containing 36 per cent protein (7 per cent ammonia). Figuring on the analysis from the protein basis velvet beans, seed and pods, are found to be about one-half as valuable as cottonseed meal of the above quality. As Experiment A had shown that the velvet beans in the pod were unpalatable to most of the cows, it was decided to add corn meal to the bean and pod ration to increase the palatability. The same amount of corn was fed to each lot so that the variable factor was the amount of velvet beans and cottonseed meal; these were in the proportion of two to one. Thirty pounds of corn silage was fed to each cow daily throughout the experiment.

The prices of the feeds were as follows:

Cottonseed meal	-----	\$40.00 per ton
Velvet beans	-----	22.50 per ton
Corn	-----	1.18 per bu.
Silage	-----	4.00 per ton

METHOD OF FEEDING AND HANDLING THE COWS

The cows all had the run of a small wooded lot during the entire period of the test. Water was kept before them at all times and salt was given at regular intervals. Milking and feeding was done twice daily in the Station barn. Individual weights of the cows were taken weekly. Records of production were kept by weighing the milk and making a Babcock test of each cow's milk at each milking.

TABLE NO. I.—*Showing Total Amount of Feed Consumed, and Amount of Milk and Butterfat Produced*

Concentrates	Ground Velvet beans	Cottonseed meal	Corn	Silage	Lbs. milk produced	Lbs. butterfat produced
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Velvet beans in pods, 6 parts Corn, 4 parts	1370.9		913.9	6720	3252.4	167.737
Cottonseed Meal, 3 parts Corn, 4 parts		678	894	6700	3418.1	174.103

Table I shows that the ration containing velvet beans did not produce as much milk or butterfat as the ration containing cottonseed meal, when used in the proportion 2 to 1.

In agreement with the previous year's work, it was found that the velvet bean ration was not altogether palatable. It was also observed that individuality was a strong factor, one cow developing such a liking for the bean ration that she was not satisfied with the cottonseed meal ration when changed.

TABLE No. II.—*Showing Amount of Feed Required to Produce 100 Pounds of Milk and 1 Pound of Butterfat.*

Concentrates	Feed for 100 Lbs. Milk			Feed for 1 Lb. Butterfat		
	Grain	Silage	Cost	Grain	Silage	Cost
	Lbs.	Lbs.		Lbs.	Lbs.	
Velvet beans in pods, 6 parts	42.1			8.1		
Corn, 4 parts	28.0	206.6	\$1.476	5.4	40.0	28.45c
Cottonseed meal, 3 parts	19.8			3.8		
Corn, 4 parts	26.1	196.0	\$1.336	5.1	38.4	25.79c

Table II shows that two parts of velvet beans in pods did not produce as much milk or butterfat as one part of cottonseed meal. The cottonseed meal at \$40.00 per ton was also more economical than were the velvet beans at \$22.50.

Based on the production of milk in this test, where 6 parts of velvet beans in pods were fed with 4 parts corn, the velvet beans were worth only \$15.80 per ton when cottonseed meal was worth \$40.00 per ton, the cottonseed meal being fed in proportion of 3 parts to 4 parts of corn.

On the same basis for butterfat production the beans were worth \$15.92 per ton.

TABLE No. III.—*Showing Ratio of Productive Value of Cottonseed Meal and Velvet Beans in Pods, Ground.*

Price 1 Ton Cottonseed Meal	Relative Value 1 Ton Velvet Beans in Pods, Ground
\$50.00	\$20.62
48.00	19.68
45.00	18.27
40.00	15.80
35.00	13.56
30.00	11.21

From the above table an easy calculation shows that on an average two and one-half pounds of velvet beans with pods, ground were equal in feeding value and economy to one pound of good cottonseed meal.

TABLE NO. IV.—*Showing the Influence of the Two Rations on the Weights of the Cows. (56 Days).*

Concentrates	Av. weight at beginning	Av. weight at close	Average loss
Velvet beans in pods, 6 parts; Corn, 4 parts	761.5 lbs.	758.12 lbs.	3.38 lbs.
Cottonseed meal, 3 parts Corn, 4 parts	763 2 lbs	761.75 lbs.	1.45 lbs.

Table IV shows that the cows on each ration lost very slightly in flesh during the test. The loss was probably due to the weather conditions rather than to the feed. During the first period there was considerable cold, wet weather, and both lots lost in weight. During the second part of the test the weather was more favorable and both lots gained in weight.

SUMMARY

1. Cottonseed meal, 3 parts, mixed with corn meal, 4 parts, produced more milk and butterfat than ground velvet beans and pods, 6 parts, mixed with corn meal, 4 parts, when fed with silage.

2. The cottonseed meal mixture produced both milk and butterfat more economically than the velvet bean mixture, when velvet bean meal was priced at \$22.50 and cottonseed meal at \$40.00 per ton.

3. When cottonseed meal (36 per cent protein or 7 per cent ammonia) and velvet beans and pods were separately fed with corn in the proportions used in this experiment, the velvet beans were worth \$15.80 per ton for milk production, and \$15.92 per ton for butterfat production when the cottonseed meal was worth \$40.00 per ton.

4. The two rations were practically the same in efficiency in maintaining the weight of the cows.

5. The velvet bean ration was not palatable to all of the cows in the test. The milk flow was maintained by those cows consuming a full ration of the velvet beans.

6. On the basis of the experiment quoted above, two and one-half pounds of velvet beans with pods, ground, were equal in feeding value and economy to one pound of good cottonseed meal.

PART III
VELVET BEAN PASTURE COMPARED
WITH CORN AND DRIED BLOOD;
VELVET BEAN MEAL COM-
PARED WITH CORN FOR
FATTENING HOGS

BY
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INTRODUCTION

The farmers of Alabama are using the crop of velvet beans in two ways to feed their hogs. The most common method of utilizing the crop is to allow the hogs to "hog down" the bean crop after a heavy frost has killed the vines, and the corn crop has been gathered from the bean field. A number of farmers gather the mature beans and feed them later in the winter to the breeding herd of hogs or to the fattening hogs.

As the prices on concentrated feeds have advanced very rapidly in the past few years the following experiments were planned with a view of comparing the feeding value of the new crop with other concentrates commonly used for fattening hogs.

In the fall of 1914 arrangements were made with Dr. J. F. Yarbrough, of Columbia, Alabama, to feed some hogs on his farm. Dr. Yarbrough furnished the bean pasture, the feeds, and the hogs for the experiment. Mr. J. A. McLeod was stationed on the farm and had personal supervision of the experiment.

OBJECT OF EXPERIMENT A

The object of this experiment was to compare velvet bean pasture with certain high priced concentrates (corn and blood meal) for fattening hogs.

RATIONS AND THE VELVET BEAN CROP

Fifteen pigs used in this experiment were divided equally as to the breeding, quality, and size, into three lots of five each and fed as follows:

LOT I: Corn, 10 parts,
 Dried blood, 1 part.

LOT II: Corn, 10 parts, } one-half ration (2 pounds to
 Dried blood, 1 part } each 100 lbs. live weight).
 Velvet bean pasture

LOT III: Corn, 10 parts } one-fourth ration (1 pound to
 Dried blood, 1 part, } each 100 pounds live weight).
 Velvet bean pasture.

The velvet beans were planted in the rows with the corn. The corn was gathered after frost, (October 27th). The yield of beans was estimated as a thirty percent crop. The poor yield was due to a poor stand, extremely dry weather during the greater part of the growing period, and to the early frost. As the bean crop was grown with the corn crop, the cost of labor to produce the combined crop and the rent of the land was divided equally with the two crops. The cost of the bean seed and labor of dropping the seed was charged to this crop. With the local price of labor of ten cents per hour for man labor, six cents per hour for boy labor, and five cents per hour for horse labor, and rent at \$3.00 per acre, the cost of producing an acre of beans amounted to \$2.83. On October 27th a heavy frost killed the bean vines. Two one-acre plots were fenced off and the experiment started on November 3rd. For several days the hogs did not relish the beans, but they gradually became accustomed to them and ate same with relish for the remainder of the experimental period.

THE PIGS

The pigs used in this experiment were raised on the farm where the experiment was conducted. They were out of native sows and sired by a Berkshire boar. At the beginning of the experiment they averaged approximately 68 pounds.

METHOD OF FEEDING

Lot I was confined in a dry lot and fed twice daily. Lots II and III had the run of one acre each of velvet bean pasture and were fed a one-half and one-fourth ration respectively of corn, ten parts, and blood meal, one part. The details of the experiment are shown in the following table:

*Velvet Bean Pasture Compared With Dry Lot Feeding
Lots I and II (November 3rd to December 3rd,
1914) 30 Days. Lot III (November 3rd to No-
vember 26th, 1914) 23 Days.*

LOT	No. of Pigs	RATION	Av. Initial weight	Av. final weight	Total Av. gain	Av. daily gain	Feed to make 100 lbs. gain	Total cost to make 100 lbs. gain
I	5	Corn, 10 Parts Dried blood, 1 part } Full Ration	70	97.6	27.6	.92	316 31.6	\$6.59
II	5	Corn, 10 parts Dried Blood, 1 part } One-Half Ration Velvet Bean Pasture	67.2	95.8	28.6	.95	150.07 15.007 .7 A	\$4.91
III	5	Corn, 10 parts Dried Blood, 1 part } One-Fourth Ration Velvet bean Pasture	67.6	89.8	22.2	.964	71.03 7.103 .9 A	\$4.02

The daily gains were satisfactory for the type of hogs used. The pigs were not finished when the experiment was closed, but this crop of beans was only one-third of an average crop, and an average crop would have fed the pigs for a period equal to three times the length of this test, which would have given a good finish to the pigs.

By examining the column showing the amount of grain for 100 pounds gain of each lot it will be seen that the bean crop saved considerable high priced concentrates.

In this experiment one-fourth ration of corn and dried blood produced larger daily gains, and produced the gains much cheaper than a one-half ration when the pigs were grazing the velvet bean field.

The grazing period in Lot III was a week shorter than in Lot II, as the amount of concentrates was much smaller in Lot III, and the pigs used up the bean crop much more quickly.

SUMMARY STATEMENTS

1. The 15 pigs used in this test were divided into three equal lots and given the following feeds:

- LOT I: Corn, 10 parts }
 Dried blood, 1 part } in dry lot.
- LOT II: Corn, 10 parts, } one-half ration (2 pounds to
 Dried blood, 1 part } each 100 pounds live weight).
 Velvet bean pasture.
- LOT III: Corn, 10 parts, } one-fourth ration (1 pound to
 Dried blood, 1 part } each 100 pounds live weight).
 Velvet bean pasture.

2. The crop of velvet beans was only one-third of an average crop due to poor stand, dry weather during the growing season, and early frost on October 27th.

3. To make 100 pounds gain in live weight it required 316 pounds corn and 31.6 pounds dried blood in Lot I; 15.07 pounds corn and 15.007 pounds dried blood and .7 A. velvet beans in Lot II; and 71.03 pounds corn and 7.1 pounds dried blood with .9 A. velvet beans in Lot III.

4. When corn was worth \$1.00 per bushel, dried blood \$60.00 per ton and velvet bean pasture \$2.83 per acre, it cost \$6.59 to produce 100 pounds increase in weight in Lot I; \$4.91 in Lot II; and \$4.02 in Lot III.

5. The velvet bean crop proved to be entirely satisfactory as a hog feed. It should be remembered that a crop of corn was gathered from this area before the hogs were turned in.

OBJECT OF EXPERIMENT B

The object of this experiment was to compare a ration of corn with a ration of one-half corn and one-half velvet bean meal (threshed beans) to determine the value of the velvet bean meal as a supplement to corn for fattening hogs, and to study the effects of the velvet bean on the quality of carcass and the lard.

FEEDS AND METHOD OF FEEDING

The corn was ground into a coarse meal. The velvet bean meal was made by grinding the threshed velvet beans into a fine meal. The corn and bean meal were mixed together and enough water added to make a thin slop. The day's feed was divided into equal parts, the night and morning feeds being fed at regular hours. The corn was valued at \$1.00 per bushel, and the velvet bean meal at \$34.00 per ton.

Corn Versus Corn One-half and Velvet Bean Meal One-half, December 27, 1916 to March 27, 1917, (90 Days).

LOT	No. of Hogs	RATION	Av. Initial weight	Av. final weight	Av. total gain per pig	Av. daily gain	Feed to make 100 lbs. gain	Cost of 100 lbs. gain
I	5	Corn alone	75	149	74	.813	Lbs. 483.57	\$8.64
II	6	Corn one-half, velvet bean meal	70	128	58	.64	268.82	\$4.80
		one-half, no pods					268.82	\$4.57
								\$9.37

The hogs were butchered at the close of the experiment and notes made of the carcass and the melting points determined for the lard from the kidney fat.

The fat of the velvet bean fed hogs was found to be slightly darker in color than the fat of the corn fed hogs. It was found that the lards of the corn fed hogs had on the average a melting point slightly higher than the bean fed hogs, although the carcasses of both lots were firm. The average melting point for the corn fed lot was 46.04 degrees C., and for the velvet bean fed lot, 44.35 degrees C.

SUMMARY STATEMENTS

1. The daily gains were not large, but satisfactory for the size of the pigs used in the experiment.

2. To make 100 pounds of increase in live weight required 483.57 pounds of corn in Lot I; 268.82 pounds of corn and 268.82 pounds of velvet bean meal or a total of 537.64 pounds in Lot II.

3. When corn was worth \$1.00 per bushel, and velvet bean meal \$34.00 per ton, it cost \$8.64 and \$9.37 to make 100 pounds of increased live weight in Lots I and II respectively.

4. The velvet bean fat was slightly darker than the corn fed carcasses.

5. The average melting point of the lard from Lot I was 46.04 degrees C; for Lot II, 44.35 degrees C. All of the carcase of both lots were firm.