

THE COLORADO EXPERIMENT STATION

FORT COLLINS

HOG MILLET, CORN AND BARLEY IN FATTENING RATIONS FOR PIGS

PROGRESS REPORT OF LIVESTOCK FEEDING EXPERIMENT—1929

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Pigs fattened on proso or hog millet, sometimes called hershey, plus a protein supplement. These pigs outgained pigs fattened on corn and same protein supplement.

Summary

1. Self-fed in winter-fattening tests with protein and mineral mixture supplements, ground barley showed 88.1 percent the feeding value of shelled corn while ground hog millet showed 103 percent the value of shelled corn.

2. Protein and mineral supplement requirements were reduced in increasing amounts by the substitution of (1) barley for corn, (2) hog millet for corn and (3) a corn and hog millet mixture for corn.

3. The palatability of grains fed, ranged in the following order: Hog millet, hog millet and corn, shelled corn, barley.

4. Pigs fattened on hog millet showed a higher dressing percentage and a lower carcass shrinkage in the cooler than pigs fattened on corn or barley.

5. The pork from hog-millet-fed pigs was of excellent texture and flavor both when cooked fresh and after curing.

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Introduction

With the extensive development of forage and grain crops for the eastern plains area of Colorado, there has been little work to determine how they can be used to best advantage in fattening livestock on dryland farms.

The forage crops have proved the surest crops for the drylands ¹while the common, fattening grains—corn, barley, oats and hog millet ²are produced in abundance in eastern Colorado.

During 1928 almost 80 percent of the corn, 71 percent of the barley and 50 percent of the oats produced in Colorado were produced in the non-irrigated sections of the state while over 90 percent of the hog millet produced in the United States at the present time is produced in northeastern Colorado and 2 counties in North and South Dakota.

Proso or hog millet, has proved to be one of the best emergency grain crops for eastern Colorado drylands. It can be seeded up to July 1 and requires only from 70 to 120 days to mature, depending on whether an early or late variety is used and also whether seeded early or late. The same variety will take longer to mature when seeded early. At the United States Government Experiment Station at Akron, millet has averaged 24.6 bushels per acre on fallowed land over an 11-year period. On small-grain stubble, early spring worked, and kept free from weeds to seeding time, the yield is about 35 to 40 percent less, running about 15 to 17 bushels per acre.

The millet used in this feeding test weighed 56 pounds per bushel and was clean, plump and of excellent quality. It was finely ground.

Because of lack of definite knowledge concerning the feeding value of millet it has sold at a relatively low price compared to corn and barley. Millet used in this experiment has produced exceptionally good results. It has proved to be a very palatable feed. Used with a protein supplement, and a simple mineral mixture, it produced high gains and pork of good quality.

For best results with cattle, sheep or hogs, millet should be finely ground before feeding.

Millet is reported to have a good supply of vitamin A which may explain to some extent the very good results secured in feeding it.

Corn used in the test was a No. 2 yellow, weighing 53.2 pounds per bushel. It was grown locally and was fed shelled in Lot 1 and ground in Lot 4. A No. 1 feed barley, weighing 37.5

1 U. S. D. A. Bul. 1304.

2 Sometimes locally termed hershey.

pounds per bushel and produced locally, was fed. It was finely ground for the feeding test.

ANALYSIS OF GRAIN USED IN FEEDING TEST

	Water	Ash	Crude Protein	Carbohydrate		Fat	No. Analyses
				Fiber	N.-Free Extract		
Corn	14.7	1.4	9.6	1.8	67.9	4.7	2
Barley	9.0	2.5	11.9	4.9	69.7	2.1	2
Hog millet	9.6	3.5	12.0	8.3	63.4	3.3	2

Objects of the Experiment

1. To compare dryland fattening grains when self-fed with the same supplementary feeds to fattening pigs in drylot.
2. To observe the palatability of shelled corn, ground barley and ground proso or hog millet when self-fed with a suitable protein and simple mineral supplement.
3. To determine the value of a mixture of ground corn and hog millet relative to that of shelled corn or ground millet fed separately with the same supplementary feeds.

Animals Used

Poland China and grade Hampshire pigs secured from local farmers were used.

Methods Used

The pigs were divided into 4 lots of 10 each as nearly uniform as possible with regard to previous treatment, weight, breeding and sex. Averages of 3 individual weights taken at the beginning and end of the experiment were used.

The different lots were confined in dry pens, each furnished with a separate compartment self feeder, straw shed and automatic water tank heater. Water was heated during the cold weather. The pigs were given free choice of the feeds used. A constant supply of grain, protein mixture, mineral mixture and salt was kept in separate compartments of each feeder at all times

Rations Fed

- Lot 1.—Shelled corn, protein mixture, mineral mixture, salt.
- Lot 2.—Ground barley, protein mixture, mineral mixture, salt.
- Lot 3.—Ground millet, protein mixture, mineral mixture, salt.
- Lot 4.—Ground corn and ground millet (mixed equal parts by weight), protein mixture, mineral mixture, salt.



Pigs fattened on shelled corn with protein supplement

Protein Mixture

The protein mixture which was self-fed in all lots was an improved "trinity" mixture and was composed by weight of 2 parts (60 percent protein) meatmeal tankage to 1 part each of cottonseed meal (43 percent protein) and alfalfa meal (13 percent protein). Feeding experiments have shown this mixture to be more efficient than any of its ingredients used singly.¹ In this experiment the protein mixture was guaranteed to contain 44 percent protein and cost \$53.50 per ton.



Pigs fattened on corn and hog millet mixture with protein supplement

¹ Nebraska Agricultural Experiment Station.

Mineral Mixture

A simple mineral mixture was self-fed in all lots to furnish calcium (lime), phosphorus, sodium and chlorine (salt). Calcium was supplied by reprecipitated lime cake, a by-product of beet-sugar manufacture, which contains about 96 percent calcium carbonate. Phosphorus was supplied by spent bone black, a by-product of the barium process for desugarizing beet molasses that has passed thru the Steffens plant. Sodium and chlorine were supplied by finely ground salt. The minerals were mixed in the following proportions by weight: Lime cake 40 parts, spent bone black 40 parts and salt 20 parts. This simple mineral mixture cost only \$1.00 per cwt. Salt was also self-fed separately.

DETAILED REPORT OF EXPERIMENT

19 pigs per lot fed December 24 to April 28, 1929—125 days
(Table based on one average pig)

Lot No.	1	2	3	4
Rations self-fed, free choice	Shelled Corn	Ground Barley	Ground Millet	Br. Millet $\frac{1}{2}$ Gr. Corn $\frac{1}{2}$
Salt and simple minerals self-fed in all lots	Trinity Mixture*	Trinity Mixture*	Trinity Mixture*	Trinity Mixture*
Feedlot weight at start.....	74.7	73.9	71.7	72.8
Feedlot weight at finish....	269.0	256.1	291.0	293.0
Shipping shrink (pounds)	.5	1.1	5.0	7.0
Akron to Denver (percentage)	.18	.43	1.72	2.39
Market weight at Denver....	268.5	255.0	286.0	286.0
Gain at Market.....	193.8	181.1	214.3	213.2
Daily gain based on market weight	1.55	1.45	1.71	1.71
Daily feed consumed (pounds)				
Shelled or ground corn....	6.41			3.70
Ground barley		7.05		
Ground millet			7.50	3.70
Trinity mixture*				
{ Meatmeal tankage ....	.46	.38	.35	.30
{ Cottonseed meal ....	.23	.19	.17	.15
{ Alfalfa meal .....	.23	.19	.17	.15
Mineral Mixture** .....	.012	.007	.005	.009
Salt .....	.007	.004	.005	.003
Feed required per 100 pounds gain				
Shelled or ground corn....	413.2			217.0
Ground barley		486.3		
Ground millet			437.5	217.0
Trinity mixture*				
{ Meatmeal tankage ...	29.4	26.0	20.3	17.3
{ Cottonseed meal	14.7	13.0	10.1	8.7
{ Alfalfa meal	14.7	13.0	10.1	8.7
Mineral mixture** .....	.8	.5	.3	.5
Salt .....	.4	.3	.3	.2
Feed cost per 100 pounds gain at market	\$ 7.17	\$ 7.25	\$ 5.25	\$ 6.15

FINANCIAL STATEMENT BASED ON ACTUAL COSTS AND MARKET RETURNS

10 pigs per lot fed December 24 to April 28, 1929—125 days
(Table based on one average pig)

Lot No.	1	2	3	4
Rations self-fed, free choice Salt and simple minerals self-fed in all lots	Shelled Corn Trinity Mixture*	Ground Barley Trinity Mixture*	Ground Millet Trinity Mixture*	Fr. Millet ½ Gr. Corn ½ Trinity Mixture*
Cost per pig @ \$10.40 cwt...	\$ 7.77	\$ 7.68	\$ 7.46	\$ 7.57
Feed cost per head.....	13.89	13.13	11.25	13.11
Est. fixed costs including in- terest, equipment and labor	2.25	2.25	2.25	2.25
Shipping and selling expense	2.14	2.05	2.24	2.24
Total cost at market.....	26.05	25.11	23.20	25.17
Selling price per cwt.....	11.00	11.00	11.00	11.00
Gross receipts per pig.....	29.54	28.05	31.46	31.46
Profit per pig	3.49	2.94	8.26	6.29
Dressing percentage, carcass chilled 72 hours in cooler.	72.29	70.69	74.05	73.18
Actual percentage shrink of carcass chilled 72 hours in cooler	3.19	3.28	2.93	3.10
Feed costs—Shelled corn...\$1.35 cwt.		Tankage	\$72.00 per ton	
Ground corn ... 1.45 cwt.		Alfalfa meal	20.00 per ton	
Ground barley.. 1.20 cwt.		Cottonseed meal	50.00 per ton	
Ground millet .. .95 cwt.		Mineral mixture	20.00 per ton	
		Salt	20.00 per ton	
Trinity mixture*				
{ Meat meal tankage (60 percent protein) 2 parts				
{ Cottonseed meal (43 percent protein) 1 part				
{ Alfalfa meal (13 percent protein) 1 part				
Mineral mixture**				
{ Spent bone black 40 parts				
{ Lime cake 40 parts				
{ Salt 20 parts				

Marketing Records and Slaughter Tests.—After being on feed 125 days the pigs were weighed at the United States Government Experiment Station at Akron, then trucked 150 miles and marketed at Denver. Thru the cooperation of the Armour Packing Company at Denver a fairly complete study of the slaughter data was made possible.

FINAL WEIGHTS OF HOGS (BY LOTS) AND DRESSING PERCENTAGES

Developed from feedlot weights and from original records furnished thru courtesy of the Armour Packing Company at Denver, Colorado

Ration Fed	Shelled Corn and Supple- ments	Ground Barley and Supple- ments	Ground Millet and Supple- ments	Ground Corn, Millet and Supple- ments
No. of pigs per lot	10	9	10	10
Final liveweight at Akron.....	2690	2305	2910	2930
Liveweight at market (Denver)				
Selling weight	2685	2295	2860	2860
Liveweight just before slaughter.....	2640	2250	2840	2820
Warm dressed weights { head on, leaf lard in... { head off, leaf lard out..	2222 2005	1860 1677	2419 2182	2378 2160
Chilled weight of carcass after 72 hours in cooler	1941	1622	2118	2093
Dressing percentage based on:				
1. Feedlot weight and carcass with head off, leaf lard out. Chilled 72 hours in cooler	72.15	70.36	72.78	71.43
2. Selling weight { Warm weight head on leaf lard in	82.76	81.05	84.58	83.15
{ Warm weight head off, leaf lard out	74.63	73.07	76.29	75.52
{ Chilled weight after 72 hours in cooler	72.29	70.69	74.05	73.18
3. Slaughter weight and carcass with head off, leaf lard out, chilled 72 hours in cooler	73.52	72.09	74.58	74.22
4. Selling weight, with head on and leaf lard in and with a 2½ percent estimated shrink (Packer's con- ventional figure) in cooler.....	80.67	79.04	82.45	81.01
Percentage shrink of carcass (chilled 72 hours in cooler).....	3.19	3.28	2.93	3.10

The slaughter tests except for one instance all established a uniform sequence in dressing percentage. The hogs fed straight millet showed the highest dressing percentage followed in order by the millet and corn mixture, straight corn and finally barley.

An actual percentage shrink on the carcasses from warm dressed weights to chilled weights after 72 hours in the cooler is of especial significance showing the effect of millet in reducing this shrink.

Discussion

1. The palatability of the grains fed to fattening pigs ranged in the following order: Ground millet, ground millet and ground corn mixed, shelled corn, ground barley. The millet was easily the most palatable feed while ground barley was so unpalatable that the pigs wasted quite a bit of it by rooting it out of the self feeder.

2. Protein requirements per unit gain decreased with the following order of grains fed, shelled corn, ground barley, ground millet, ground millet and ground corn mixed.

3. More ground barley by 17.7 percent was required than shelled corn to produce unit gains, but 11.6 percent less of protein supplement and 33 percent less of minerals were required where the barley was fed. At existing prices with shelled corn at \$27.00 per ton, ground barley was worth \$23.80 per ton or 88.1 percent the value of shelled corn.

4. Five and nine-tenths percent more ground millet was required than shelled corn to produce unit gains, but 31.1 percent less of the protein supplement and 50 percent less of the minerals were required where the millet was fed. At existing prices with shelled corn worth \$27.00 per ton, the ground millet showed a feed replacement value of \$27.80 per ton or 103 percent the value of shelled corn. Its market value was only \$19.00 per ton ground.

5. A mixture of ground corn and ground millet proved more efficient than corn or millet fed alone but due to the much lower price of the millet, the mixture did not produce as high returns as the millet fed alone with the same protein mixture in this experiment. With the corn and millet mixture, however, an increase of 5.1 percent more grain effected a saving of 41.0 percent in the protein supplement required and a saving of 42 percent in the minerals required over a straight shelled-corn ration.

6. At market all hogs were fed shelled corn. This increased the shrink on millet hogs, but in spite of this disadvantage the hogs fed on millet with and without corn produced heavier gains than hogs fed on shelled corn or barley.

7. The order of dressing percentages except in one instance ran highest for hogs fattened on millet, followed by those fattened on millet and corn, then corn and finally barley.

8. The above order prevailed with regard to shrinkage of carcass in the cooler.

9. A cooking test indicated that millet-fed pork has an excellent flavor, quite comparable to corn-fed pork.

10. A curing test was conducted by the packer on the pork fattened on hog millet. The hams that came out of cure, were processed and smoked in the usual manner and were then tested. Quoting from their report: "The hams had a very nice color, were firm and had a good texture as well as having very good quality. We would consider them as being of very good grade."