

1969

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## Recommended Citation

Hauser, Larry A. and Wahlstrom, Richard C., "Evaluation of Milk Products in Rations for Early Weaned Pigs" (1969). *South Dakota Swine Field Day Proceedings and Research Reports, 1969*. Paper 3.  
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## Evaluation of Milk Products in Rations for Early Weaned Pigs

Larry A. Hauser and Richard C. Wahlstrom

It is important to have an economical starter ration that will be highly palatable and result in rapid pig gains. This is especially true for pigs weaned at three to four weeks of age. The ration must provide all of the essential nutrients in a readily available form and at a cost which is not prohibitive.

Previous research with partially delactosed whey has shown that the product may be less palatable for young pigs. This was thought to be due to the increased percentage of salts which occurs when some of the lactose is removed. If this is true, then the amount of salt normally added to the ration must be reduced to compensate for the higher level of salt in the whey product.

The trials reported here were designed to study the effects of feeding milk products with and without sugar in comparison to a corn-soybean meal ration and to determine the effect of the increased salts in delactosed whey on palatability, feed consumption, and rate of gain.

### Experimental Procedure

In trial I, 180 crossbred pigs were weaned at approximately three weeks of age and randomly allotted into twenty lots with nine pigs each. Four lots received each of the following treatments:

1. Basal
2. Basal + 10% delactosed whey
3. Basal + 10% delactosed whey + 5% sugar
4. Basal + 10% dried skim milk
5. Basal + 10% dried skim milk + 5% sugar

The rations were formulated to contain 18% protein. The composition of the rations fed is shown in table 1.

In trial II, sixty crossbred pigs averaging about four weeks of age were stratified according to weight and divided into two replicates on a weight basis. The pigs were randomly allotted within replicates to five lots per replicate with six pigs per lot.

Two lots received each of the following treatments:

- Treatment 1 - Ration 1, Basal
- Treatment 2 - Ration 2, 10% whey + 0.5% salt
- Treatment 3 - Ration 3, 10% whey with no salt
- Treatment 4 - Rations 2 and 3 free-choice
- Treatment 5 - Rations 1, 2 and 3 free-choice

These rations were also formulated to contain 18% protein. The composition of the rations is shown in table 2.

The pigs in both trials were confined in 8 x 10 ft. inside, cement floored pens and feed and water were provided ad libitum. In trial II, the feeders in pens receiving treatments 4 and 5 were rotated daily to prevent pigs from eating out of the same feeder due to habit or position of the feeder in the pen.

Each trial was conducted over a five-week period. The pigs were weighed weekly and feed consumption was recorded on each weigh day.

### Results and Discussion

#### Trial I

The results of this trial are summarized in table 3. Pigs receiving the rations containing whey or dried skim milk had average daily gains of 0.71 lb. when the rations did not contain sugar and 0.73 lb. when the rations contained 5% sugar compared to average daily gains of 0.66 lb. for pigs receiving the basal diet. This represented a 7.5% increase in average daily gain for milk products alone and a 10.5% increase for milk products plus sugar. These differences, while showing a trend, were not statistically significant.

Good feed efficiencies were obtained on all treatments, with the average feed efficiency in each treatment being below 2 lb. of feed for each pound of gain.

The rate of gain of pigs weaned at an early age is generally related to their weaning weight. This effect was demonstrated in this trial in that the first replicate of pigs averaged approximately 4 lb. per pig more in initial weight than the pigs in the other three replicates (15.7 vs. 11.7 lb.). At the termination of the trial there was a difference of approximately 12 to 14 lb. in average pig weights. The smaller pigs took a much longer period in adjusting to the rations and gained very little the first two weeks of the trial. However, the treatment differences in rate of gain were similar between the heavy and lightweight pigs.

#### Trial II

The results of this trial are summarized in table 4. The pigs in the first replicate were approximately 3 lb. heavier at the start of the experiment than the pigs in replicate 2. However, only in treatments 4 and 5 did the heavier pigs gain faster than the lighter pigs.

There were no differences in the gains of pigs fed whey with or without additional salt when these rations were fed alone. However, in replicate 1 pigs consumed more of the whey ration than of the whey and salt ration. A part of this difference can be attributed to feed wastage which can be noted in the poorer feed conversion for pigs on the whey ration in replicate 1.

The results of this trial are in agreement with those of trial I in that pigs receiving the whey rations alone gained slightly faster than those pigs fed the corn-soybean meal ration (0.67 vs. 0.59 lb. per day). It is difficult to explain why the pigs in replicate 1 that received the rations on a free-choice basis gained at a more rapid rate than pigs on the other treatments. Since this large difference in gains did not exist in replicate 2, it appeared that it was due to chance and the more uniform performance of the pigs in treatments 4 and 5 of replicate 1.

The free-choice consumption of rations 2 and 3 (treatment 4) and of rations 1, 2 and 3 (treatment 5) are shown in figures 1 and 2, respectively. There was no consistent preference established for any of the rations. When the pigs had a choice between the two whey rations, they consumed more of the ration containing salt in one replicate while the other replicate consumed about equal quantities of each ration. When pigs had a choice of all three rations, they consumed about equal quantities of the corn-soybean meal and whey ration with lesser amounts of the whey and salt ration in one case and in the other instance the pigs consumed very little of the whey ration, about 0.46 lb. per day of the whey and salt ration and 1.12 lb. per day of the soybean meal ration.

#### Summary

In this experiment 260 crossbred pigs were used to study the effects of adding milk products to rations for early weaned pigs. Average daily gain, feed consumption, feed efficiency and palatability of delactosed whey were studied. Although a slight increase in average daily gains occurred when pigs were fed rations containing milk products, this increase was not statistically significant. There was also no indication that the salts in the delactosed whey caused a palatability problem.

Table 1. Composition of Rations, Trial I (Percent)

Ingredients	Basal	Whey	Whey + Sugar	Dried Skim Milk	DSM + Sugar
Ground yellow corn	63.9	57.0	50.5	60.5	54.5
Soybean meal (48.5%)	22.2	20.0	21.5	16.0	17.0
Rolled oats	10.0	10.0	10.0	10.0	10.0
Sugar	--	--	5.0	--	5.0
Delactosed whey	--	10.0	10.0	--	--
Dried skim milk	--	--	--	10.0	10.0
Dicalcium phosphate	1.9	1.5	1.5	1.6	1.7
Ground limestone	0.5	0.3	0.3	0.4	0.3
Trace mineral salt	0.5	0.2	0.2	0.5	0.5
Vitamin-antibiotic premix <sup>a</sup>	1.0	1.0	1.0	1.0	1.0

<sup>a</sup> Provided 1827 I.U. vitamin A, 340 I.U. vitamin D, 4 mg. riboflavin, 8 mg. calcium pantothenate, 18 mg. niacin, 10 mcg. vitamin B<sub>12</sub>, 50 mg. chlor-tetracycline, 50 mg. sulfamethazine and 25 mg. penicillin per pound of ration.

Table 2. Composition of Rations, Trial II (Percent)

Ration	1	2	3
Ingredients	Basal	10% Whey + 0.5% Salt	10% Whey
Ground yellow corn	63.9	56.7	57.0
Soybean meal (48.5%)	22.2	20.0	20.0
Rolled oats	10.0	10.0	10.0
Delactosed whey	--	10.0	10.0
Dicalcium phosphate	1.9	1.5	1.5
Ground limestone	0.5	0.3	0.3
Trace mineral salt	0.5	0.5	--
Trace mineral mix, gm. <sup>a</sup>	--	--	7.1
Zinc oxide, gm.	--	--	1.4
Vitamin-antibiotic premix <sup>b</sup>	1.0	1.0	1.0

<sup>a</sup> Calculated to furnish approximately the same minerals as provided by the trace mineral salt except for the sodium and chloride.

<sup>b</sup> See table 1.

Table 3. Whey and Dried Skim Milk for Early Weaned Pigs

Ration	Basal	Whey	Whey + Sugar	Dried Skim Milk	DSM + Sugar
No. of pigs <sup>a</sup>	36	36	36	36	35 <sup>b</sup>
Av. init. wt., lb.	12.6	12.8	12.7	12.7	12.7
Av. final wt., lb.	35.8	37.5	38.2	37.3	38.3
Av. daily gain, lb.	0.66	0.71	0.73	0.71	0.73
Av. daily feed, lb.	1.21	1.32	1.41	1.37	1.35
Av. feed/lb. gain, lb.	1.85	1.91	1.94	1.92	1.84

<sup>a</sup> Four replicate lots of 9 pigs each per treatment.

<sup>b</sup> One pig died.

Table 4. Whey in Early Weaned Pig Rations

Treatment	Rep	1	2	3	4	5
		Basal	Whey + Salt	Whey	Rations 2 & 3 Free- Choice	Rations 1,2,&3 Free- Choice
No. of pigs	1	6	6	6	6	6
	2	6	6	6	5 <sup>a</sup>	6
Av. init. wt., lb.	1	18.7	18.7	18.7	18.7	18.5
	2	15.8	15.8	15.8	15.8	15.8
	Av.	17.3	17.3	17.3	17.3	17.2
Av. final wt., lb.	1	38.7	42.5	42.2	45.7	50.3
	2	37.3	39.0	39.5	37.6	39.2
	Av.	38.0	40.8	40.9	41.7	44.8
Av. daily gain, lb.	1	0.57	0.68	0.67	0.77	0.91
	2	0.61	0.66	0.68	0.62	0.67
	Av.	0.59	0.67	0.67	0.70	0.79
Av. daily feed, lb.	1	1.51	1.35	1.93	1.91	2.11
	2	1.44	1.35	1.31	1.31	1.62
	Av.	1.48	1.35	1.62	1.61	1.87
Av. feed/lb. gain, lb.	1	2.65	1.98	2.87	2.47	2.32
	2	2.34	2.03	1.94	2.11	2.43
	Av.	2.50	2.01	2.41	2.29	2.38

<sup>a</sup> One pig was removed.

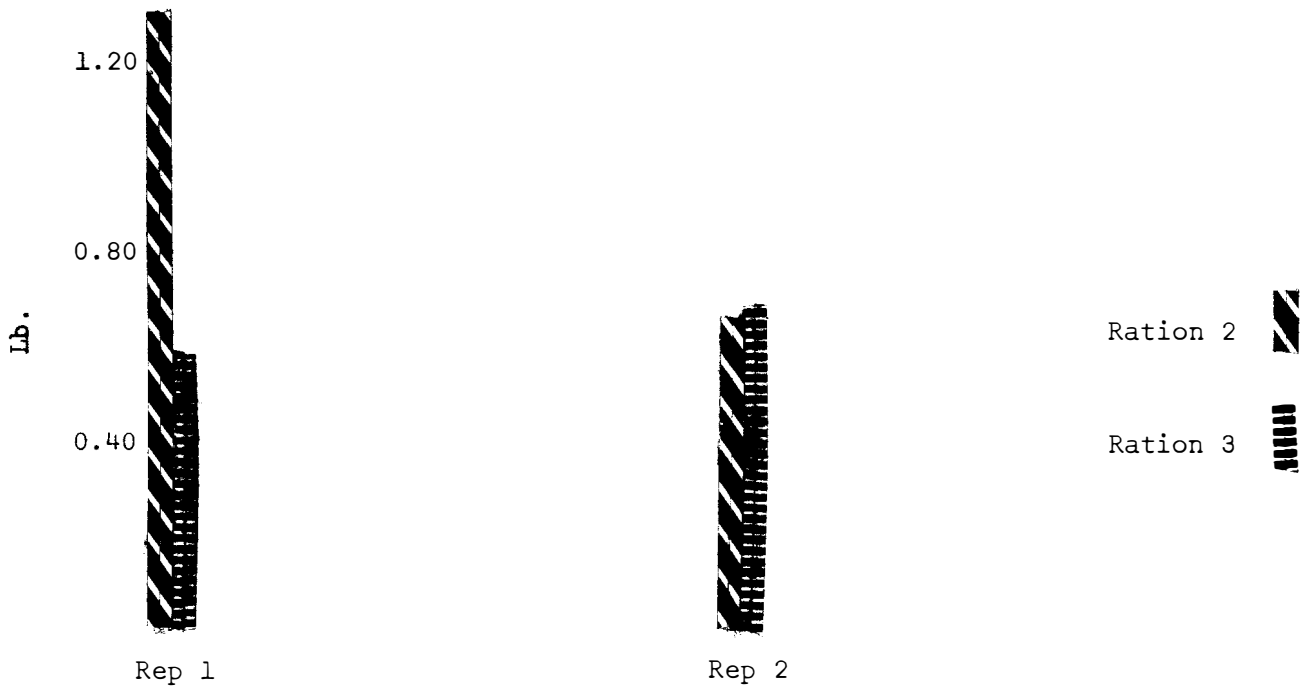


Figure 1. Average daily feed consumption, treatment 4 .

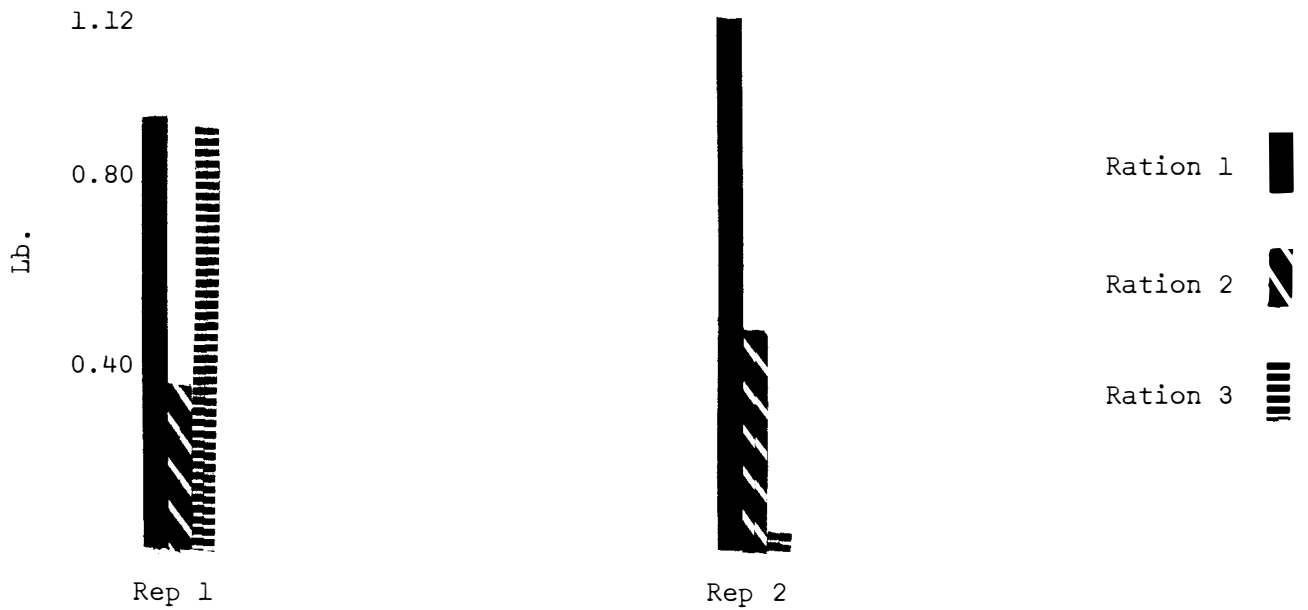


Figure 2. Average daily feed consumption, treatment 5