# Effects of Whey Products on Performance of Weaned Pigs

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## Summary

Three trials were conducted utilizing 458 pigs with an average age of 21 days to study the effects of adding whole whey, or partially delactosed whey from two sources in the diet of weaned pigs on growth, feed intake, and feed efficiency. Additionally, the optimum length of time to feed whole whey and the relationship of age at weaning and addition of whey to the diet were studied.

The addition of whey to the diets increased performance of the pigs by 2 to 3 pounds at 8 weeks of age. Pigs fed 20% whole whey diets for 2 weeks performed similarly as those fed 20% whole whey for 5 weeks. No differences were observed between pigs fed whole whey and partially delactosed whey diets. Partially delactosed whey from two different sources produced similar pig performance.

Pigs weaned at 3 and 5 weeks performed similarly and out-performed those weaned at 2 weeks. Pigs fed 20% whole whey (weaned at 2, 3, 4, or 5 weeks) outperformed pigs fed the control diet.


## Introduction

The modern swine industry has become very efficient in its efforts to maximize production. Confinement rearing has been an effective tool in increasing survival rate postweaning due to the availability of a highly controllable environment for the young pig. However, feeding the early weaned pig for maximum growth is a problem many producers must face.

Weaning at 3 to 4 weeks of age has several advantages. Sow milk production fails to meet the pig's growing nutritional requirements between the third and fourth week of lactation. In addition, at 3 weeks postpartum, envolution of the sow's reproductive tract has occurred, thereby rendering her capable of supporting another pregnancy. By weaning early, the number of litters per sow per year can be increased.

However, some disadvantages have become evident from early weaning. The passive immunity obtained from the colostrum of the sow has started to disappear and the baby pigs are only beginning to develop their own immune system. This makes the pig very susceptible to disease. For this reason, it is necessary to have adequate facilities to keep the newly weaned pig warm, dry, and draft-free. Also,

the enzymatic system of the 3 to 4 week old pig is not yet capable of digesting many common feedstuffs. In addition, a newly weaned pig must learn to eat out of a feeder, drink from the waterer, and develop a new social order. Lack of weight gain is due to a lack of feed intake in many pigs. Therefore, a highly nutritious diet is essential to maximize performance.

The trials presented in this paper were designed to attempt to prevent or minimize the postweaning growth check seen in many pigs. The effects of dried whole whey and partially delactosed whey were studied. The effect of weaning age on the response to whey additions and the duration of whey feeding were also studied.

## Procedure

**Animals:**

Pigs were weighed and feed consumption measured weekly. All trials were terminated when pigs were 8 weeks old.

Four hundred and fifty eight pigs were utilized in three trials. Pigs in Trials I and III were weaned at 15 to 26 days of age. Those in Trial II were weaned at 2, 3, 4 or 5 weeks. Pigs were allotted to treatment by litter and weight with no regard to sex.

**Housing:**

Pigs were housed in the Kansas State University Swine Research Unit nursery. This building is totally environmentally controlled with woven wire floors and V-type flush gutter. Pens 4 ft x 5 ft contained nipple waterers and self-feeders. Temperature was maintained at pig comfort.

**Diets:** Diets are shown in Tables 1 and 2.

Trial I. The first trial was conducted to study the effects of feeding 20% whole whey for 2 weeks or 5 weeks, and 20% delactosed whey from two sources to a control milo-soybean meal diet. One source of partially delactosed whey was obtained from Land'O Lakes Company. It was considered to be of known quality. The second source was obtained from a local elevator. It was considered to be of unknown quality, yet typical of what most swine producers might purchase. The treatments for Trial I are: 1) control diet, 2) 20% whole whey diet, 3) 20% partially delactosed whey, 4) 20% partially delactosed whey purchased from a local elevator, 5) 20% whole whey diet for two weeks followed by the control diet.

Trial II. In this trial, pigs were weaned at 2, 3, 4 or 5 weeks and fed the control diet or the 20% whole whey diet. This trial was conducted to compare the effect of weaning age on the response to whey addition.

Trial III. Pigs were fed 20% whole whey for 0, 1, 2, 3, 4 or the entire 5 week trial. In this trial, we were trying to minimize cost to the producer by switching to the cheaper control diet as early as possible without affecting pig performance.

## Results

Trial I. The results from Trial I are shown in Table 3. By adding whole whey or delactosed whey, pig weight gain and feed intake were improved for the first 2 weeks postweaning. Feed efficiency was similar for all treatments. For the entire 35 day trial, a significant improvement in gain per pig was observed by adding a whey product to the diet. No differences were observed in gain, feed intake or feed efficiency between pigs fed the 20% whole whey diet and pigs fed the two different 20% partially delactosed whey diets or the 20% whole whey diet fed for 2 weeks. Feed intake and feed efficiency for the entire 35 day trial were similar for all treatments.

Trial II. Pigs were weaned at two, three, four and five weeks. Pigs weaned at three and five weeks performed similarly (Table 4), and were heavier at 8 weeks than those weaned at two weeks. Feed efficiency improved as weaning age increased from 2 to 5 weeks.

Across all weaning ages, pigs that were fed the 20% whole whey diet gained approximately 2 to 3 pounds more than those fed the control diet (Table 5). Pigs fed whey consumed more feed than pigs fed the control diet.

Trial III. Trial III was designed to determine the optimum length of time to feed a 20% whole whey diet. The results appear in Table 6. For the first 2 weeks of the trial, pigs fed no whey or whey for only 1 week tended to gain less than those fed whey for the first 2 weeks. However, by the completion of the 35-day trial, no differences were seen in weight gain per pig. Similarly, feed intake and feed conversion were not different among treatments.

## Discussion

The addition of a milk product to the diet improved performance of pigs weaned at 2, 3, 4, or 5 weeks of age. The data suggests that there was no difference in pig performance when fed a whole whey or a partially delactosed whey. No differences were seen between the two sources of delactosed whey: the source of known quality vs the source of unknown quality.

Feeding the whey diet for 2 weeks appears to be as beneficial as feeding the whey for 5 weeks. This is of economic advantage to the producer.

Pigs weaned at 3 weeks are similar to those weaned at 5 weeks in weight at 8 weeks of age. Weaning at 3, 4, or 5 weeks improves pig performance over weaning at 2 weeks.

Death loss for all trials combined was .85%.

Table 1. Composition of Diets - Trial I, %

| Ingredients | A | B | C | D |
|---|---|---|---|---|
| Milo | 56.82 | 43.22 | 43.22 | 43.22 |
| Soybean meal | 37.10 | 31.50 | 31.50 | 31.50 |
| Corn oil | 2.00 | 2.00 | 2.00 | 2.00 |
| Whey | | 20.00 | | |
| Delactosed whey (source 1) | | | 20.00 | |
| Delactosed whey (source 2) | | | | 20.00 |
| Limestone | 1.30 | 1.00 | 1.00 | 1.00 |
| Dicalcium phosphorus | 1.50 | 1.20 | 1.20 | 1.20 |
| Trace mineral premix | .10 | .10 | .10 | .10 |
| KSU vitamin premix | .50 | .50 | .50 | .50 |
| Salt | .30 | .10 | .10 | .10 |
| ASP-250 | .25 | .25 | .25 | .25 |
| L-lysine HCl | .13 | .13 | .13 | .13 |
| | 100.00 | 100.00 | 100.00 | 100.00 |
| Lysine | 1.31 | 1.41 | 1.41 | 1.41 |
| Crude Protein | 21.40 | 20.40 | 20.80 | 20.80 |
| Calcium | .90 | .90 | 1.10 | 1.10 |
| Phosphorus | .72 | .73 | .77 | .77 |

Table 2. Composition of Diets - Trials II and III, %

| Ingredients | A | B |
|---|---|---|
| Milo | 58.82 | 45.22 |
| Soybean meal | 37.10 | 31.50 |
| Whey | | 20.00 |
| Limestone | 1.30 | 1.00 |
| Dicalcium phosphorus | 1.50 | 1.20 |
| Trace mineral premix | .10 | .10 |
| KSU vitamin premix | .50 | .50 |
| Salt | .30 | .10 |
| ASP-250 | .25 | .25 |
| L-lysine HCl | .13 | .13 |
| | 100.00 | 100.00 |
| Lysine | 1.31 | 1.41 |
| Crude Protein | 21.60 | 20.60 |
| Calcium | .90 | .90 |
| Phosphorus | .72 | .74 |

Table 3. Performance of pigs weaned at 20 + 2 Days, Fed Whole Whey or Partially Delactated Whey[a]

| | Treatments | | | | |
|---|---|---|---|---|---|
| lb | Control | 20% del. whey | 20% del. whey #1 | 20% del. whey #2 | 20% whey for 2 weeks |
| Initial wt. | 10.63 | 10.58 | 10.55 | 10.45 | 10.42 |
| Weeks 1 & 2: | | | | | |
| Gain/pig | 2.52 | 3.75 | 3.77 | 3.55 | 3.67 |
| Feed intake/ pig | 5.98 | 6.97 | 6.67 | 6.42 | 7.20 |
| Gain:feed | .42 | .53 | .56 | .52 | .51 |
| Entire 5-week trial: | | | | | |
| Gain/pig | 22.11 | 24.73 | 24.75 | 24.68 | 23.63 |
| Feed intake/ Pig | 37.87 | 42.17 | 40.30 | 39.93 | 38.53 |
| Gain:feed | .60 | .59 | .62 | .62 | .62 |

[a]Each value is the mean of 5 pens with 6 pigs per pen.

Table 4. Performance of Pigs Weaned at Two, Three, Four, or Five Weeks[ab]

| | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Initial weight, lb | 8.41 | 12.10 | 16.40 | 21.16 |
| Final weight, lb | 31.43 | 37.33 | 41.33 | 38.93 |
| Feed intake, lb | 43.48 | 41.99 | 37.50 | 25.69 |
| Gain:feed | .52 | .60 | .62 | .70 |

[a]Each value is the mean of 4 pens with 4 pigs per pen.
[b]Trial endpoint at 8 weeks of age.

Table 5. Performance of Pigs Weaned at Two, Three, Four, or Five Weeks and Fed Control or 20% Whey Diets[a,b]

| | Control | 20% whey |
|---|---|---|
| Initial weight, lb | 14.41 | 14.63 |
| Final weight, lb | 36.31 | 38.19 |
| Feed intake, lb | 35.13 | 39.19 |
| Gain:feed | .63 | .59 |

[a]Each value is the mean of 16 pens with 4 pigs per pen.
[b]Trial endpoint at 8 weeks of age.

Table 6. Performance of Pigs Weaned at 22 + 4 Days, Fed 20% Whey For Various Durations[ab]

| | Diets | | | | | |
|---|---|---|---|---|---|---|
| | Control | Whey 1 wk | Whey 2 wk | Whey 3 wk | Whey 4 wk | Whey |
| Initial weight, lb | 13.60 | 13.52 | 13.64 | 13.48 | 13.68 | 13.64 |
| Weeks 1 and 2: | | | | | | |
| Gain/pig, lb | 4.48 | 4.60 | 5.08 | 5.40 | 5.36 | 5.56 |
| Feed intake/pig, lb | 7.36 | 7.52 | 8.04 | 8.40 | 7.92 | 8.20 |
| Gain:feed | .61 | .57 | .64 | .64 | .67 | .67 |
| Entire 5-week trial: | | | | | | |
| Gain/pig, lb | 26.48 | 25.70 | 27.20 | 27.58 | 27.12 | 26.48 |
| Feed intake/pig, lb | 40.96 | 42.12 | 44.24 | 45.52 | 42.00 | 43.12 |
| Gain:feed | .65 | .62 | .62 | .59 | .62 | .62 |

[a]Each value is the mean of 5 pens with 5 pigs per pen.
[b]All pigs were fed control diet after the allotted time period on the whey diet.