SEGES
Swine Production

Rye for Sows

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Feed for gestating sows containing 60% rye, followed by feed for lactating sows containing 35% rye did not negatively affect sow productivity. Rye that is ergot-free may be included in these quantities in sow diets.

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Summary

A study was conducted to test two feeding strategies for sows: One strategy included the use of feed with 60% rye during gestation and 35% rye during lactation. In the other strategy, sows were fed a diet containing barley and wheat. The study was conducted at two swine farms that used dry feeding with commercially produced compound feed over a period of 24 months. At one farm, the sows were fed by an electronic sow feeding system (ESF); the other farm used floor feeding during gestation.

Overall, the study yielded the following results, based on 5,603 breedings and 845 standardized litters:

- Litter size and farrowing rate are not affected by feeding of rye.
- Density of feed with large amounts of rye was higher; this requires attention to correct adjustment of feeders.
- The sows' milk yield was not affected; there were no differences in litter weight gain and litter weaning weight.

- Over a period of 24 months, the sows' durability – measured by culled sows – was not affected.

The treatment feed was not analyzed for ergot content, because the feed was acquired as a complete feed mix. Home mixers using rye should evaluate the occurrence of ergot, which can cause reduced milk production in sows. Ergot can also cause prolonged contractions of the uterus that may cause abortion or stillbirth. The simplest way to estimate the occurrence of ergot is to walk the field before harvest, particularly evaluating the crops in the spray tracks, as this is often the location of ergot. If plants with ergot are found, the rye should not be used in sow diets in large quantities.

Background

Rye is an alternative crop to barley and wheat. Rye is less sensitive to lack of moisture, so especially on sandy soils the yield potential in kernels and straw is higher and more stable than in wheat – particularly second-year wheat. The cost of growing conventional rye is also lower compared with wheat, as the need for weed control is lower (for more information, see www.farmtal.dk.).

Rye generally has a mixed reputation for use in sow feed, primarily due to problems with ergot. Ergot contains ergotamine and ergometrine, which can cause abortions and influence milk yield; therefore, the limit is 0 for ergot in sow feed (1). Ergot infects the rye plant during flowering. The female flower can be fertilized either by pollen from the male rye plant, which results in healthy kernels, or it can be "fertilized" by ergot spores, which the female plant mistakes for pollen. The ergot fungus develops along with the kernels; this results in a mix of healthy kernels and small black-brown banana-shaped specks, which are kernels containing ergot.

Feed companies can separate the ergot specks from the kernels through light sorting, or more accurately photo sorting, where the separation is facilitated by the color difference between rye and ergot. Often, ergot-infested grains also contain ergot spores in addition to ergot specks; the spores should also be removed.

Today, most commercially available varieties of rye are hybrids, which are less susceptible to ergot; this has substantially reduced the problem.

Rye and wheat kernels are anatomically similar. Rye has a naturally high phytase activity; it is 3 to 6 times higher than in wheat, barley, oats, and triticale; therefore, the effect of heat treatment is substantial. This is one of the reasons that rye is the fastest crop to sprout from the soil. As soon as the rye kernel becomes moist in warm conditions, the natural phytase activity in the kernel begins, accelerating germination.

Rye also has a higher content of dietary fiber, and the composition differs from that of wheat. One difference is the higher content of arabinoxylans in rye. The microbes in the large intestines of sows convert the arabinoxylans to butyrate and acetate. This leads to increased viscosity in the gastrointestinal tract, which reduces the rate of passage through the intestine and therefore is more filling.

Experiments with piglets and finishers have shown lower feed intake if the feed contains 40% rye, compared with feed without rye [2], [3]. This indicates that the composition of dietary fiber and the increased viscosity increase satiety of pigs for a longer time after a meal. It is likely that the sows will react in the same way and therefore will also benefit, especially during periods of restricted feeding. Sows that are fed a diet with a higher fiber content have been shown to have increased eating time, decreased feed intake, fewer stereotypic behaviors, and decreased eating motivation [4]; this can lead to fewer confrontations during feeding. Results of several studies also indicate that a higher fiber content decreases stereotypic behavior such as empty chewing [4], [5], [6], [7]. It is not clear what the daily level of dietary fiber should be to reduce stereotypic behavior, but studies indicate that a level of dietary fiber from 12% to 20% is sufficient [8]. Thus, feeding a large amount of rye will probably help reduce such behaviors, as rye has a fiber level above the estimated value for these effects. Fiber promotes a healthy intestinal flora; thus, an increased intake of fiber may also increase intestinal health, benefiting the sow’s general health and productivity.

This indicates that an increased amount of rye in sow diets may potentially result in several beneficial effects on the eating motivation of restricted-fed sows, which may increase productivity, but these effects need to be experimentally verified. The use of rye decreases the cost of feed, as rye has an estimated cost of 15 DKK ($2.25) lower per 100 kg than winter wheat (see www.farmtal.dk).

SEGES Swine Production's current recommendation – based on experience – is that a maximum of 30% rye should be added to diets for gestating and lactating sows.

The purpose of this study was to evaluate the effect on total born pigs per litter, farrowing rate, and litter weight gain when sows were fed a diet containing 60% rye during gestation and 35% rye during lactation.

Materials and Methods

The study was conducted over a period of 24 months at two swine farms that used dry feeding with commercially produced compound feed.

Production characteristics for each farm were as follows:

- Farm A had 950 sows that were fed via an electronic sow feeding system (ESF) in the gestation barn. The farm weaned pigs every week at an age of 4 weeks; sows were moved to the gestation barn after breeding, whereas gilts were moved to the gestation barn after pregnancy was confirmed. Straw was provided as environmental enrichment material.
- Farm B had 1,250 sows and used floor feeding. The farm weaned pigs every other week at an age of 5 weeks. Sows were moved to the gestation barn in pens with floor feeding every other week, when the whole group had been bred. The barn was furnished with pens for 13 pregnant sows, and each weaning group was distributed in five pens. There was a separate barn for gilts with 14 gilts per pen. Straw was provided as environmental enrichment material.

Treatment Groups

At the beginning of the study, sows were divided into two groups, such that the age of sows was the same in each group. Half of the sows were fed control diets without rye and the other half were fed diets with the aforementioned rye content. In both groups, the sows followed the farm's regular procedures for weight control, selection of feed curves, and management. At Farm A, sows were in the same group during the entire experimental period. At Farm B, sows were allowed to change groups when they moved to the gestation barn.

Diets

At both farms, all sows were provided diets that were formulated according to Danish standards for nutrients in sow diets. The farms had different feed suppliers during the experimental period: Farm A purchased feed from Danish Agro and Brdr. Ewers A/S, whereas Farm B purchased feed from Mollerup Mølle A/S and Danish Agro.

To prevent ulcers, 10% non-heat treated, acid-treated rolled barley was added to all feed mixes from Danish Agro and Brdr. Ewers, whereas Mollerup Mølle A/S used coarser milling and a larger die (8mm) at pelleting. Stomach health was not tested during the experimental period, as feedback from the two farms did not indicate problems with ulcers. The control and treatment diets were continually formulated for similar nutrient content for gestating and lactating sows, respectively. There were variations in the type of raw materials over time, but the content of rye was unchanged, and the same grain and protein sources were used in the control and treatment diets. All diets had phytase added. The rye was delivered by the feed companies and was typical for the Danish rye harvest in 2014, 2015, and 2016. No specific analyses were conducted for ergot in the rye. The average composition of raw materials in all diets during the experimental period at the two farms is shown in Appendix 1. The calculated content of soluble and insoluble fiber as well as digestible carbohydrates and fermentable carbohydrates is also shown in Appendix 1. On these four parameters, the diets are very similar.

Feeding

At both farms, all gilts prior to breeding were fed according to the same strategy and with similar diets without rye. At breeding they were randomly assigned to one of the two treatment groups and fed either control or treatment diet at Farm B, whereas this did not occur until after the gilts were confirmed pregnant at Farm A.

The wean to breeding period

From weaning to breeding all sows – both the control and the treatment group – were provided approximately 4.5 feed units (approx. 13,500 kcal ME) per day.

Gestation period

At Farm A, sows were fed individually with ESF. Gilts, however, were housed in pens where they were floor fed according to two different feeding curves. After pregnancy was confirmed they were transferred to the ESF pens, where they followed one feeding curve. Three feeding curves were used for sows. The feeding curves are shown in Table 1. Farm personnel decided which feeding curve sows followed during gestation.

Table 1. Feeding curves used for gilts and pregnant sows in both the control and treatment group at Farm A (Feed units per sow per day[1]).

Days from breeding	Gilts	Thin sows	Average sows	Fat sows
1	2.4 – 2.7	2.5	2.5	2.5
2	2.4 – 2.7	3.8	3.0	2.5
29	2.4	3.8	2.7	2.3
30	2.6	3.4	2.4	2.0
31	2.7	3.2	2.2	1.8
84	2.9	3.3	2.7	2.3
86	3.1	3.4	3.1	2.8
88	3.3	3.5	3.5	3.5
114	2.5	2.5	2.5	2.5

1) One feed unit = Approx. 3,000 kcal ME

At Farm B, gilts and sows were floor fed in groups after breeding; therefore, only three curves were available (see Table 2). The farm personnel decided which feeding curve the sows in each pen followed during the gestation period.

Table 2. Feeding curves used for gilts and pregnant sows in both the control and the treatment group at Farm B (Feed units per sow per day[1]).

Days from breeding	Gilts	Thin sows	Average sows
1	2.4	4.0	3.0
28	2.4	4.0	3.0
29	2.8	3.2	2.5
84	2.8	3.2	2.5
85	3.3	3.5	3.5
112	3.3	3.5	3.5
114	2.0	2.5	2.5

1) One feed unit = Approx. 3,000 kcal ME

The lactation period

In the farrowing barn, control and treatment sows, respectively, at both farms were fed according to the same guidelines. The sows were fed to approximate appetite with the following minimum amounts.:

- Until the 7th day after farrowing: Minimum 2.0 Feed Units (FU) + 0.2 FU per pig per day.

- From the 7th to the 14th day after farrowing: Minimum 2.0 FU + 0.3 FU per pig per day.
- From the 14th day after farrowing to weaning: Minimum 2.0 FU + 0.4 FU per pig per day.

Nurse Sows

At both farms, the same number was selected and the same strategy used for lactating sows in the two groups, and each farm's regular procedures for selection and feeding of nurse sows were followed.

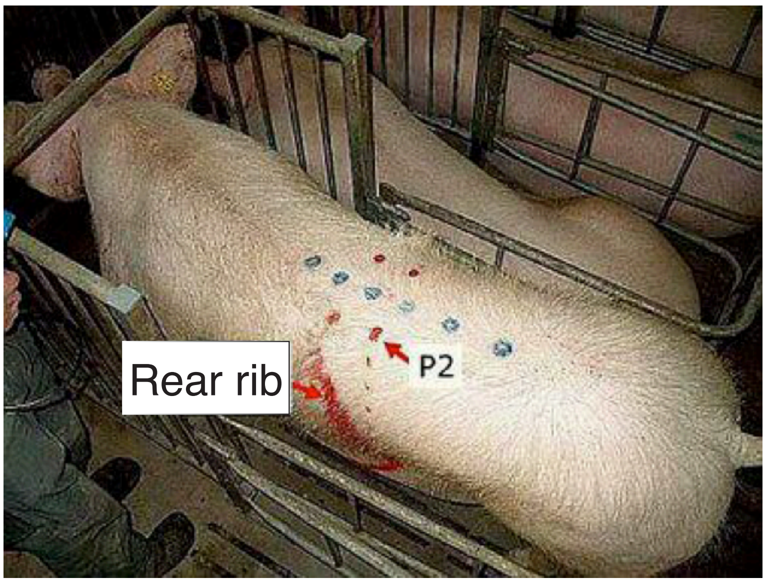
Registrations

Production control was conducted at both farms, supplemented with culling reasons for all sows that were culled during the experimental period. The following general parameters were collected for the sows:

- Treatment for MMA and use of farrowing assistance were recorded.
- Four control and four treatment sows were randomly selected per weekly group at Farm A, and twice as many every other week at Farm B, to create the standardized litters that were used to measure the sows' yield in the two groups. The standardized litters were established in the following way:
    - As a starting point, the litter size was standardized to 14 or 15 pigs per litter, and litter adjustment could only occur in the group during the initial 24 hours after farrowing. If a sow had less than 14 live pigs, average pigs (no more than 72 hours old) were moved from other sows within that group to establish the standardized litters. If a sow had more than 14 live pigs per litter, the smallest pigs in the litter were removed to establish the standardized litters.
- At litter standardization and at weaning, litters were weighed and the litter weight gain was used as a measure of the sows' milk yield.
- Dead pigs during the lactation period were registered.
- For a period of nine months, all born pigs – both live and dead – were weighed before standardization to determine if the feeding during the gestation period influenced pig birth weight.

Backfat Measurement

To evaluate the body condition of gilts and sows at transfer to the farrowing barn, P2 backfat thickness was measured using a Leanmeter at Farm A and a Sonograder at Farm B. Picture 1 shows where the backfat measurement was recorded. P2 is the point on the horizontal line from the rear part of the rear rib (red dots) and on this line 7 cm from the midline. The blue dots indicate the spinous processes on the spine.



Picture 1. P2 indicates the point of scanning.

Reproduction Results

When animals were culled from the farrowing pens, the date and the cause were registered. It was the farm manager's responsibility to decide which animals to cull from the pens; this management practice was the same at both farms. Reproduction results from animals that were transferred to the sick pen for more than three days were not included in the study. At farrowing, total born, live born, and stillborn pigs per litter were registered, and the farrowing rate was calculated.

At both farms, sows were considered independent observations and production numbers were calculated per animal. At Farm B the production numbers were also calculated per pen.

Control of feed amount

Each month, the density of the feed in the lactation and farrowing barns was measured. Changes in density resulted in adjustment of the feeder settings and of the volume boxes in the farrowing barn at both farms. At Farm A, the accuracy of the feeder outputs was also checked every month.

Feed Analysis

Feed samples were collected from all diet batches and stored frozen at -20°C. Quarterly, a pooled sample for each diet was submitted for analysis (Feed units, crude protein, crude fat, ash, water, calcium, phosphorus, lysine, methionine, and threonine) at Eurofins Steins Laboratory – a total of eight pooled samples were collected per diet from each farm.

Statistical Analysis

The primary parameters were: Total born pigs per litter, farrowing rate, and litter weight gain. The secondary parameter was: reasons for culling of sows from the pens.

For the calculation of total born pigs per litter and farrowing rate, all sows at Farm A were considered independent observations, as control and treatment sows were in the same pen; however, corrections were made for farrowing group. At Farm B, where each pen contained only sows from the same group, pens were considered independent observations. The variable “total born pigs per litter” was analyzed with proc mixed in SAS with the two factors “group” and “parity” as systematic effects. Parity 6 and higher was categorized as one level combined. For Farm A, farrowing group was included as a random effect. For Farm B, pen was included as a random effect per block within farrowing group. It was assumed that the two groups were equivalent if the confidence interval for the difference between the two groups was less than +/- 0.6 pigs.

For the variable “farrowing rate” logistic regression was performed using proc glimmix in SAS, where the two factors “group” and “parity” were included as systematic effects. Farrowing group was included as a random effect for Farm A, while pen was included as a random effect per block within farrowing group for Farm B. It was assumed that the two groups were equivalent if the confidence interval for the difference between the two groups was less than +/- 5 point in farrowing rate. However, because the farrowing rate had to be transformed in the statistical model, this could not be tested.

The variable “litter weight gain” was analyzed with proc mixed in SAS, with the two factors “group” and “parity” as systematic effects. Farrowing group is included as a random effect. Corrections were made for starting weight, number of lactation days, and number of weaned pigs.

Results and Discussion

Feed analyses

The feed analyses indicated reasonable similarity with the expected content of nutrients (See Appendix 2). Therefore, only combined results for the entire experiment are shown for the control and treatment diets.

The density of the rye-based diets was higher than that of the control feed; this made it challenging to adjust the feeders to ensure that they provided the same amount of calories per feeding. This challenge was greatest at Farm B during the gestation period, because the feed was distributed through large volume boxes. Overall, sows on the rye diets tended to receive slightly more calories during the gestation period, which resulted in greater backfat thickness, than the control sows (Table 3).

Production Results

The overall production results are shown for each farm, as the feed distribution methods during the gestation period were different and the farms had different lactation periods. The data are shown in Table 3.

Table 3. Overall production results from Farm A and B (non-weighted averages)

Farm	**A**		**B**	
Group	Control	Treatment	Control	Treatment
Number of bred sows	1,455	1,477	1,361	1,310
Number of farrowings	1,376	1,398	1,309	1,239
Parity, avg.	3.2	3.2	2.8	2.7
Farrowing assistance, %	5	7	25	29
Treatment for MMA, %	17	22	23	27
Farrowing rate, %	92	92	92	91
Total born pigs per litter	17.8	17.8	18.7	18.7
Live born pigs per litter	16.5	16.4	17.1	17.1
Stillborn pigs per litter	1.4	1.5	1.6	1.6
Backfat thickness at farrowing, mm.	17.1	16.6	15.1	16.1

There were no significant differences between the primary parameters “total born pigs per litter” or “farrowing rate” between the groups at Farm A and Farm B (Table 4)

Table 4. Total born pigs per litter and farrowing rate for Farm A and B (LSmeans values)

Farm	**A**				**B**			
Group	Control	Treatment	P value	Difference	Control	Treatment	P value	Difference
Farrowing rate, %	92.2 [90.6;93.5]	91.8 [90.2;93.2]	0.70	0.4	92.5 [90.6;94.0]	91.9 [89.9;93.5]	0.63	0.6
Total born pigs per litter	17.89	17.89	0.95	0.01 [-0.26;0.28]	19.08	19.03	0.75	0.05 [-0.25;0.35]

Table 5 shows the results from the standardized litters. There were differences in the sows’ milk yield at the two farms, but there was no effect of control versus treatment diets at either farm (Tables 5 and 6).

Table 5. Litter results from standardized litters in the farrowing barn at Farm A and B, respectively (non-weighted averages).

Farm	**A**		**B**	
Group	Control	Treatment	Control	Treatment
Number of sows	232	233	195	185
Parity, avg.	3.47	3.41	3.05	3.09
Number of lactation days	25.2	25.1	28.3	28.4
At farrowing				
Total born pigs per litter	18.2	18.3	19.6	20.1
Live born pigs per litter	16.6	16.8	17.9	18.4
Stillborn pigs per litter	1.6	1.5	1.7	1.7
Litter weight at farrowing, kg	24.2	22.6	24.8	24.7
Weight per pig at farrowing, kg	1.29	1.23	1.26	1.23
At litter standardization				
Litter size, number of pigs	14.2	14.2	14.1	14.1
Litter weight, kg	19.7	19.0	19.4	19.2
Weight per pig, kg	1.39	1.34	1.38	1.36
At weaning				
Litter size, number of pigs	12.5	12.6	12.5	12.2
Litter weight, kg	85.6	85.6	100.0	98.6
Weight per pig, kg	6.89	6.80	8.05	8.15
Litter weight gain, kg	65.9	66.7	80.6	79.4
Daily weight gain from standardization to weaning, kg/day	2.63	2.67	2.87	2.83

At both farms, the birth weight per pig was numerically lowest in the treatment group. At Farm B, this is attributed to numerically more total born pigs per litter in the treatment group. At Farm A, the difference in birth weight was larger and cannot be attributed to litter size, but the number of litters with registration of birth weight was too low for this to be unequivocally attributed to the treatment group diet.

The primary parameter “litter weight gain” did not differ between the groups at the farms. Table 6 shows LSmeans estimates for the parameters “litter weight gain” and “litter weaning weight”.

Table 6. Litter weaning weight for Farm A and B (LSmeans values)

Farm	**A**				**B**			
Group	Control	Treat-ment	P value	Difference	Control	Treat-ment	P value	Difference
Litter weaning weight, kg	85.6	84.9	0.46	0.7	98.3	98.6	0.76	0.3
Litter weight gain, kg.	66.0	66.0	0.99	0.003	78.9	79.5	0.65	0.5

Number of and reason for sow cullings from the gestation barn were recorded (see Table 7). There were differences in culling rate between the farms but no differences between treatment groups at either farm. Sows at Farm A generally had more leg problems; this may be due to the stocking density in the gestation barn. This resulted in more culled and killed sows.

Overall, it does not appear that the expected longer eating time and "density" of the treatment diet with large amounts of rye influenced the number of culled sows.

Table 7. Number of sows culled from gestation barn, and reasons for culling at Farm A and B (non-weighted averages).

Farm	**A**		**B**	
Group	Control	Treatment	Control	Treatment
Number of placed sows	1,455	1,477	1,361	1,310
Number of sows farrowed	1,374	1,381	1,269	1,219
Sows farrowed, % of placed	94.4	93.5	93.2	93.1
Number culled due to re-breeding	47	51	59	55
Culled for re-breeding, % of placed sows	3.2	3.5	4.3	4.2
Moved to sick pen, reason				
Leg problems	26	42	12	9
Weight loss	1	0	5	8
Other	7	3	16	19

Overall, an equal number of sows were moved to the sick pen in both groups. Numerically, more sows in the treatment group were culled due to leg problems at Farm A; this is attributed to the higher stocking density in the pens.

Approximately the same number of sows were culled in the two groups; there was also no difference in the number of dead sows between control and treatment groups (Table 8).

Table 8. Culling reasons for sows at Farm A and B (non-weighted averages)

Farm	**A**		**B**	
Group	Control	Treatment	Control	Treatment
Number of slaughtered	280	293	327	359
Number of dead	81	96	39	45
Dead, % of culled	22	25	11	11

Conclusion

Overall, the experiment resulted in the following conclusions about use of feed with 60% rye in gestation and 35% rye in lactation:

- Litter size and farrowing rate are not affected.
- Density of feed with large amounts of rye is higher; this requires attention to correct adjustment of feeders.
- The sows' milk yield is not affected. Litter weight gain and litter weaning weight were not different.
- Over a period of 24 months, the sows' durability – measured by culled sows – was not affected.

Diets were not analyzed for ergot, because all diets were delivered as complete feed. However, producers who mix their own feed and use their own rye should evaluate occurrence of ergot, which can lead to decreased milk yield in sows. Ergot can also cause prolonged contractions of the uterus, which can lead to abortions or stillbirths. The easiest method to evaluate the occurrence of ergot is to take a walk through the fields and particularly observe the plants in the spray tracks, as this is often where ergot occurs.

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Appendix 1

Gestation diets, both farms		
Raw ingredients, %	Control	Treatment
Barley	27.4	0.0
Barley (acid-treated and rolled)	10.0	10.0
Wheat	33.0	0.0
Rye	0.0	60.0
Oats	5.0	5.0
Beet pulp	4.0	4.0
Wheat middlings	3.3	3.7
Soybean meal, dehulled	3.0	3.1
Sunflower meal, dehulled	8.0	8.0
Rapeseed meal	2.0	2.0
Palm oil	1.1	1.1
Molasses	1.0	1.0
Limestone	1.4	1.4
Salt	0.4	0.4
Lysine, methionine, threonine, and Ronozyme	0.2	0.1
Mineral premix	0.2	0.2
Calculated content of carbohydrates		
Soluble fiber, g/FU*	49	49
Insoluble fiber, g/FU	156	157
Digestible carbohydrates, g/FU	443	450
Fermentable carbohydrates, g/FU	98	110

*Feed unit

Lactation diets, both farms		
Raw ingredients, %	Control	Treatment
Barley	30.0	7.5
Barley (acid-treated and rolled)	10.0	10.0
Wheat	28.5	17.5
Rye	0.0	35.0
Soybean meal, dehulled	17.6	18.1
Sunflower meal, dehulled	4.0	4.0
Beet pulp	2.0	2.0
Wheat middlings	2.0	0.0
Palm oil	2.0	2.0
Molasses	0.5	0.5
Limestone	1.5	1.5
Monocalcium phosphate	0.8	0.8
Salt	0.4	0.4
Lysine, methionine, threonine, and Ronozyme	0.5	0.5
Mineral premix	0.2	0.2
Calculated content of carbohydrates		
Soluble fibers, g/FU*	42	40
Insoluble fibers, g/FU	130	119
Digestible carbohydrates, g/FU	407	415
Fermentable carbohydrates, g/FU	90	94

*Feed unit

Appendix 2

Feed analyses – both farms

Gestation diets				
Diet	Control		Treatment	
	Declared	Analyzed	Declared	Analyzed
Number of tests		16		16
Crude protein, %	11.3	11.8	11.3	12.0
Crude fat, %	2.9	3.0	2.9	2.9
Ash, %	4.7	4.6	4.7	4.8
Water, %		14.0		13.9
FU* per 100 kg	100.0	100.8	100.0	100.2
Calcium, g/FU	6.5	6.5	6.5	6.6
Phosphorus, g/FU	3.9	4.0	3.9	4.1
Lysine, g/FU	4.9	5.3	4.9	5.4
Methionine, g/FU	2.0	2.2	2.0	2.3
Treonine, g/FU	3.7	3.9	4.2	4.0
Digestible Lysine g/FU (calculated)	4.0	4.3	4.0	4.3
Digestible Methionine, g/FU (calculated)	1.7	1.8	1.7	1.9
Digestible Threonine, g/FU (calculated)	3.0	3.2	3.0	3.2

*Feed unit

Lactation diets				
Diet	Control		Treatment	
	Declared	Analyzed	Declared	Analyzed
Number of tests		16		16
Crude protein, %	15.8	16.1	15.8	16.0
Crude fat, %	5.0	4.9	5.0	5.1
Ash, %	5.9	5.8	5.9	5.7
Water, %		14.0		13.8
FU* per 100 kg	107.0	106.8	107.0	107.1
Calcium, g/FU	7.5	7.5	7.5	7.4
Phosphorus, g/FU	5.3	5.2	5.3	5.2
Lysine, g/FU	8.6	8.5	8.6	8.5
Methionine, g/FU	2.7	2.7	2.7	2.7
Treonine, g/FU	5.6	5.7	5.6	5.7
Digestible Lysine g/FU (calculated)	7.7	7.6	7.7	7.6
Digestible Methionine, g/FU (calculated)	2.5	2.5	2.5	2.5
Digestible Threonine, g/FUo (calculated)	5.0	5.1	5.0	5.1

*Feed unit

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