

Skjoldborg test station

TestGris***

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The effect of AX3 gastric's particle size on performance and health status of small weaning piglets

Test conducted on request from Triple A
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Summary

The objective of the study was to investigate the effect of AX3 Gastric's particle size when included with 12.8% in a weaning diet.

The trial was made on the smallest of the newly weaned piglets. Due to their low weight, the piglets were kept in "pre-weaning" rooms for the first two weeks after weaning before being transferred to the standard weaning rooms. The effect of particle size on production and health in the "pre-weaning" rooms were investigated.

The two diets are designated "Red" and "Green" in this report. The difference in particle size between the two diets is unknown to the authors of this report

The average initial body weight of the piglets was 3.9 (\pm 0.6) and 3.9 (\pm 0.6) kg for Green and Red group, respectively. In total the test included 40 pens (20 pens per dietary treatment) and the total number of pigs was 546 and 544 in the Green and Red group, respectively.

The test period was initiated at the day of weaning and finalised at day 14 after weaning.

The parameters recorded were body weight, feed intake and mortality. Weight gain and feed conversion ratio was calculated.

The results revealed no differences between the groups for any of the parameters analysed. Consequently, the data showed no differences in weight gain, feed intake, feed conversion ratio, antibiotic treatments or mortality.

From this study it is concluded that the particle size of AX3 Gastric, when included with 12.8 % in a weaning diet, has no influence on ADG, FI, FCR or mortality in weaned piglets the first 2 weeks after weaning.

Introduction

This study was conducted on request from Triple A in the period October 18th (2021) to January 3rd (2022) at Skjoldborg test station.

The objective of the study was to investigate the effect of AX3 Gastric's particle size when included with 12.8% in a weaning diet.

The trial was made on the smallest of the newly weaned piglets. Due to their low weight, the piglets were kept in "pre-weaning" rooms for the first two weeks after weaning before being transferred to the standard weaning rooms. The effect of particle size on production and health in the "pre-weaning" rooms were investigated.

The two diets are designated "Red" and "Green" in this report. The difference in particle size between the two diets is unknown to the authors of this report

The test was designed to test the effect of diets on average daily gain (ADG), feed intake (FI) and Feed Conversion Ratio (FCR; kg feed per kg gain) in small, weaned piglets under practical pig production conditions.

Materials and methods

Animals, diets and protocol

The test station is a conventional (Health status: Blue Spf + myc + AP6 +AP12+Vac.) integrated production, which runs weekly operation in the sow unit. This means, that every week, sows farrow and piglets are weaned.

The test included a total of 1090 Danbred crossbred (Landrace/Yorkshire x Duroc) female and castrated male piglets with approximately the same number of both genders. The piglets were weaned at 25 ± 3 days of age.

Housing conditions for piglets complied fully with EU and Danish legislation. Four similar rooms of 4 pens were used. Rooms were cleaned and disinfected before insertion of piglets.

The piglets were group housed in pens and allocated randomly according to gender. Around 27 piglets were inserted in every pen after weaning. Pens are designed as 2-climate pens with an insulated piglet nest and a slatted activity area.

At the day of weaning, all piglets were distributed in the pens according to size (Small or Large). The average body weight of piglets in the pens was in the range of 3.1 to 4.9 kg. The pens were allocated to one of two diets i.e. two dry feed dispensers for each diet per room. The average initial body weight of the piglets was 3.9 (± 0.6) and 3.9 (± 0.6) kg for Green and Red group, respectively. In total the test included 40 pens (20 pens per dietary treatment) and the total number of pigs was 546 and 544 in the Green and Red group, respectively.

The test period was initiated at the day of weaning and finalised at day 14 after weaning.

The diets fed in the test were formulated and produced by Nutrimin (Ans By, Denmark). The composition of the diets is given in Appendix B. All diets were made as meal feed and delivered in 25 kg bags on the test station.

In each pen two different feeding troughs (vertical and horizontal) were used for manual feeding of dry feed and manual feeding of wet feed (dry feed + water), respectively (see picture in Appendix A).

The pigs were fed *ad libitum* with dry feed in the vertical feeders. The wet feed (dry feed mixed and soaked with water) was fed 4 times each day during the working hours (evenly distributed between 07:00 and 15:00 hours) and one time in the evening (between 20:00-23:00 hours). The pigs had permanent access to fresh water from a nipple drinker located in the pen.

Registrations

The piglets were weighed when allocated to the pens at the day of insertion and when the test was finalised on day 14. All pigs in one pen were weighed as a unit. Whenever a pig was taken out of the study due to death or disease the date and weight was recorded.

Every time a new 25 kg bag was opened it was noted for which pen it was used. Each bag was dedicated for only one pen.

The standard procedure was followed in respect of registration of any medical treatment (including date and treatment days) against diarrhoea and other infections. Furthermore, whenever a pig was taken out of the study due to death or disease the date and the weight of the piglet was recorded.

Calculations and statistics

Average daily gain per piglet was calculated as the difference in weight at insertion and exit of the test. The body weight used was an average of the piglets in each pen.

Feed intake (FI) per pen was calculated as the total amount of feed used for this pen (number of bags x 25 kg) minus the amount of feed (kg) in the last bag opened and minus any feed residues in the dry feed dispenser. The wet feed troughs were always emptied by the pigs before the test was finalised.

In all calculations, data were adjusted for number and weight of piglets taken out of trial.

Pigs taken out of study (PTO) were calculated as percentage of the initial number of piglets.

All statistical analyses were done in cooperation with the Danish Technological Institute, Department of field trials, technology and analysis, Aarhus, Denmark. Animal performance data were statistically analysed by the GLMM procedure of R (R Core Team, 2014). ADG, FI and FCR in the total test period were analysed in a Gaussian mixed effect model including initial body weight at day 0, group number and diet (Red or Green). "Group number" was included in the model as a random parameter and "diet" was included in the model as a fixed parameter. Statistical significance was accepted at $P < 0.05$.

Results and comments

The results showed that the ADG was similar ($P=0.70$) in the two dietary groups with 220 g/d and 217 g/d in the Green and Red dietary group, respectively (Table 1).

Also, the FI was very similar in the two dietary groups, with LS-Mean values of 280 and 271 g/d ($p=0.38$) in the Green and Red group, respectively. Finally, FCR was identical with 1.27 kg feed per kg gain in both groups ($p=0.90$).

Table 1. Average daily gain (ADG), feed intake (FI) and feed conversion ratio (FCR) in the pre-weaner room (4-6 kg) of pigs fed the two experimental diets.

		Diet		P-value	LSD
		Green	Red		
Initial BW, kg ^y	Day 1	3.9 (± 0.6)	3.9 (± 0.6)	-	-
Final BW, kg ^y	Day 14	6.9 (± 0.9)	6.9 (± 0.8)	-	-
ADG, g/d ^x	Day 1-14	220	217	0.70	16
FI, g/d ^x	Day 1-14	280	271	0.38	20
FCR, kg feed/kg gain ^x	Day 1-14	1.27	1.27	0.91	0.12

^y Values are means (\pm SD) ($n=20$), ^x Values are LS-means ($n=20$).

^{ab} LS-Means within rows without a common superscript differ ($P<0.05$).

The LSD values (Table 1) indicates that the test was scaled to identify differences of 16 g/d, 20 g/d and 0.12 kg feed/kg gain in ADG, FI and FCR, respectively.

Based on veterinary diagnosis, all pigs in test received treatment with Doxx-Sol (Huvepharma) in the drinking water for the first 5 days in the BabyPig rooms.

In addition, one piglet from the Green group was treated for arthritis with injections of Streptocillin® (Boehringer Ingelheim) for 3 on each other following days. There were no other treatment days against any specific diseases for pigs in test.

In table 2 the number of pigs taken out (PTO) of the study is presented. In this test all pigs taken out of test were either dead or euthanized, hence PTO and mortality covers the same in this case. The trial was not designed to analyse health data, but the data clearly demonstrates that the mortality was very low and similar for both groups.

Table 2. Pigs taken out of study (PTO, number of pigs) in the test period (day 0-14) and the reason for taking it out and PTO in % of total number of experimental pigs.

	Green	Red
PTO:		
Dead	2	0
Euthanized	1	2
Reason:		
Arthritis	1	1
Un-thriving	0	1
Other	2	0
PTO as % of total number of pigs	0.5	0.4

Conclusion

From this study it is concluded that the particle size of AX3 Gastric, when included with 12.8 % in a weaning diet, has no influence on ADG, FI, FCR or mortality in weaned piglets the first 2 weeks after weaning.

Appendix A. Photo of the pens used for test



Appendix B. Feed ingredients of the two diets used in test

Table 1. Feed ingredients of the two diets used in the baby rooms for the first two weeks after weaning (4-6 kg).

	Green, %	Red, %
Wheat, Heat treated	43.6	43.6
Barley	10.0	10
Milk powders	20.0	20
AX3 Gastric, particle size "Green"	12.8	-
AX3 Gastric, particle size "Red"	-	12.8
Plasma	2.5	2.5
Potato protein concentrate	2.5	2.5
Minerals, vitamins, amino acids etc.	4.6	4.6
Fat	2.0	2.0
Calcium formiate	1.2	1.2
Citric acid	0.8	0.8

Table 2. Expected and Analysed content of nutrients in the experimental diets

	Expected	Analysed	
		Green	Red
Crude Proten, %	20.1	19.6	20.3
Crude Fat, %	6.4	6.7	6.9
Crude Ash, %	6.8	5.8	5.7
Calcium, %	0.8	1.0	1.0
Iron, mg/kg		325	307
Kalium, %	0.68	0.68	0.69
Fosfor, %	0.74	0.79	0.78
Copper, mg/kg		145	146
Magnesium, %	0.08	0.11	0.12
Manganese, mg/kg		86	103
Sodium, %	0.3	0.33	0.35
Zinc, mg/kg		182	191
Lysine, %	15.1	15.1	14.4
Methionine, %	4.8	4.2	3.0
Threonine, %	9.6	9.0	8.3
Cysteine and Cystine, %		3.5	3.7
pH		4.9	5
ABC4		214	257