September 2017

Impact from the Use of the Piggy Guard Nucleus Feed Additive on the Productive Parameters of Weaned Piglets

- Report on findings -

Centre d'Estudis Porcins de Torrelameu. Carrer Balaguer s/n, 25138 Torrelameu (Lleida)

Content

1. Objective

Determining the impact from the Piggy Guard Nucleus feed additive on various production parameters: feed intake, weight, weight gain, feed conversion, and health status of piglets.

2. Introduction

The use of medicinal feed and antibiotics is increasingly being challenged by consumers, and there is correspondingly more and more pressure on the sector because of concerns about antibiotic resistance. There are various methods – through feed, water, vaccinations – which help reduce the use of antibiotics and medicines at production facilities.

The largest immune organ is the intestine, so any recovery of the intestine has a direct as well as indirect effect on the health of the animal.

Therefore, alternatives, such as additives from natural extracts, have been developed to guarantee good health without the use of antibiotics.

3. Materials and Methods

The use of the product Piggy Guard Nucleus in weaned piglets with a live weight between 6 and 20 kg was tested in order to examine the effects on the production parameters and the health of piglets.

Piggy Guard Nucleus from Hofmann Nutrition AG, Hokovit is a synergistic micronutrient complex consisting of: concentrate of Homexan-Stimul (specific yeast extracts), Hokolysat, premium colostrum, iron chelate, as well as herbal and plant extracts.

The key variables characterizing this study are described in Table 1.

Table 1:

Age and initial weight	21 days and 6 kg
Age and end weight	65 days and 18 kg
Duration of testing	45 days
Number of animals per group	40
Number of rooms	2
Total number of animals	80
Productive use	Commercial
Location	2 stables divided into 8 compartments
Division	5 animals per compartment

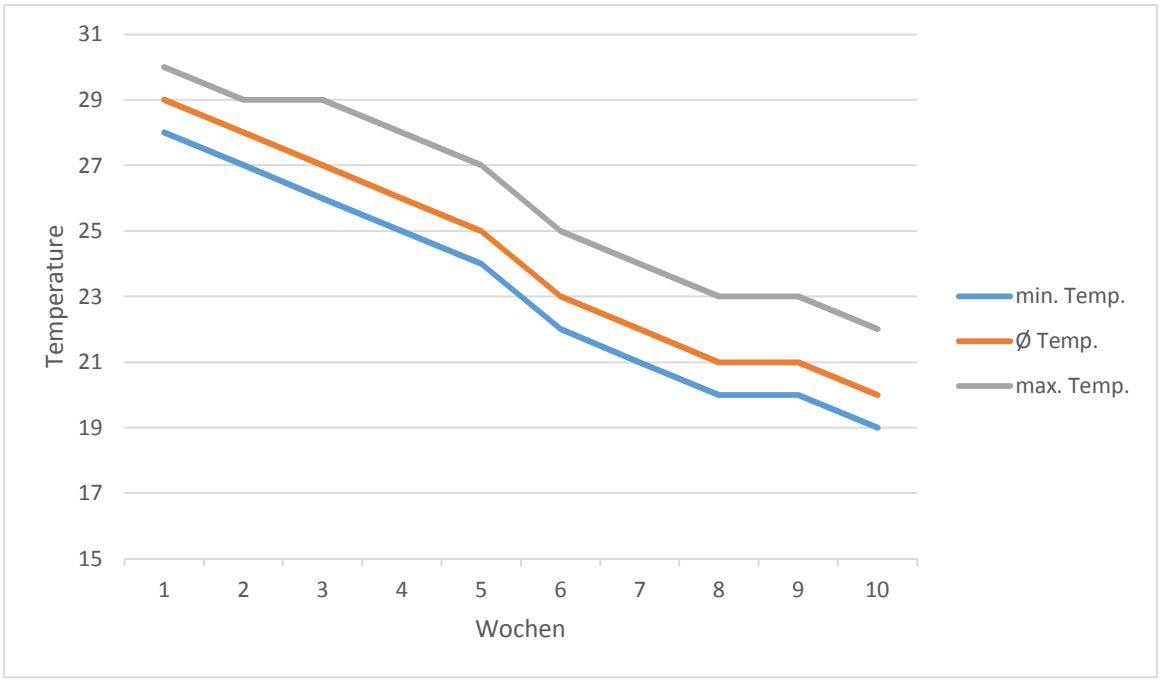
Table 2 shows the environmental conditions.

The temperature was automatically adjusted by a control software in line with the target program.

There were no significant differences in temperature or humidity in both stables, so that the climate in both stables can be described as being identical throughout the test period.

Table 2:

Age in weeks	Min. temp.	Ø temp.	Max. temp.
1	28	29	30
2	27	28	29
3	26	27	29
4	25	26	28
5	24	25	27
6	22	23	25
7	21	22	24
8	20	21	23
9	20	21	23
10	19	20	22



3.1. Animals

In total, the test involved 80 animals (40 males and 40 females) from a Landrace x Large White crossbreed, from the same breeding farm (Granja Paixau), with a weaning age of 21-24 days and a weight of 5-6 kg. This study ended after 45 days when the piglets reached a weight of 17-18 kg.

The test was carried out on two groups:

- Test on 40 piglets (20 m. & 20 f.) with Piggy Guard Nucleus feed additive

- Control on 40 piglets (20 m. & 20 f.) with addition of antibiotics and zinc oxide

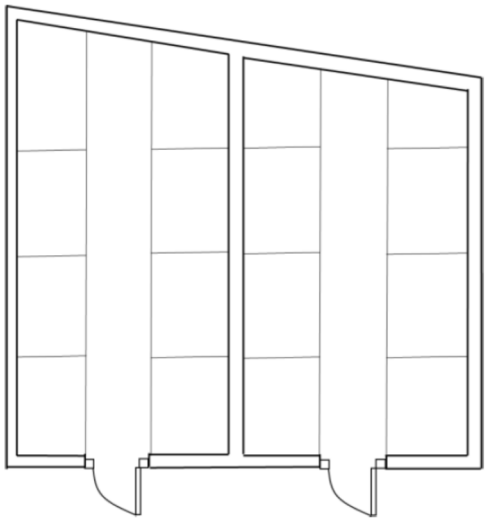
The animals were of commercial quality.

3.2. Facilities

The study took place in a transitional facility of Centre d'Estudis Porcins de Torrelameu (CEP), under the official number 833BR and code REGA ES 2523 100 35617. It is registered as a breeding center for test animals under the registry number L9900006.

The animals were divided into 16 homogeneous groups of five animals each. They were further divided into two climate-controlled rooms with eight stables (four on each side, separated by an access aisle). Each stable was supplied with fresh water and had separate feeding troughs. The area consisted entirely of slatted floors; there was a shared manure pit for four stables on the same side.

For the study, the two chambers for weaned piglets were used (see Drawing 2).



3.3. Feed and Feeding

The dosage of Piggy Guard Nucleus in the feed varied depending on whether the feed was starter or prestarter feed. The dosage information was supplied by Hofmann Nutrition AG: 10 kg/ton prestarter, and 7.5 kg/ton starter.

Table 3 shows the phases of the treatments.

	Control (C)		**Test (T)**	
	C1 Prestarter	C2 Starter	T1 Prestarter	T2 Starter
Dosage	Antibiotics + Zinc oxide	Antibiotic	Piggy Guard Nucleus 10 kg/tonne	Piggy Guard Nucleus 7,5 kg/tonne

In total, four types of feed were used in the study.

- Control (C1): Prestarter feed + Zinkoxid, + Amoxiciclin, + Neomicin
- Control (C2): Starter feed + Amoxiciclin
- Test (T1): Prestarter feed + 10 kg/tonne of Piggy Guard
- Test (T2): Starter feed + 7.5 kg/tonne of Piggy Guard

Table 4 shows the use and the phases of the different types of feed.

Regarding prestarter feed, 3.5 kg was fed to each animal in the test and control groups. After the prestarter feed, the starter feed was administered until the end of the test.

Day	Control	Test
Day 0	C1 (3,5 kg / animal)	T1 (3,5 kg / animal
Day 14	C2	T2
Day 28	C2	T2
Day 42	C2	T2

Figures 3, 4, 5 and 6 show the compositions/labels of the four different types of feed used.

B_PRESTARTER PORCS

PINSO COMPLET per l'espècie PORCINA presentat en forma de farina

MODO DE EMPLEO:

Administrar desde las 3 hasta las 6 semanas de vida (de 7 kg. a 10 kg. de peso vivo aprox.), a libre disposición, procurando que los animales dispongan de agua en todo momento.

COMPOSICIÓN

Maíz modificado genéticamente, Trigo, Harina de extracción de soja tostada y decorticada (producida a partir de haba de soja modificada genéticamente), Cebada, Alimento de harina de (habas de) soja extrusionada y decorticada (producida a partir de haba de soja modificada genéticamente), Fosfato monocálcico, Grasas animales, Carbonato de calcio, Cloruro de sodio, Aceite vegetal de soja (producido a partir de habas de soja modificada genéticamente)

COMPONENTES ANALITICOS

Proteína Bruta	18,20 %
Aceite Y Grasas Brutos	5,31 %
Ceniza Bruta	5,00 %
Fibra Bruta	3,15 %
Lisina	1,29 %
Fósforo	0,63 %
Calcio	0,58 %
Metionina	0,49 %
Sodio	0,20 %

ADITIVOS

- Antioxidantes	
Etoxiquina (E-324)	1,56 mg/Kg
Galato de propilo (E-310)	0,33 mg/Kg
- Compuestos de Oligoelementos	
Cobre (Quelato cúprico de aminoácidos hidratado) (E-4)	100,00 mg/Kg
Hierro (Sulfato ferroso monohidratado) (E-1)	100,00 mg/Kg
Iodo (Ioduro potásico) (E-2)	2,00 mg/Kg
Manganeso (Óxido de manganeso) (E-5)	100,00 mg/Kg
Selenio (Selenito sódico) (E-8)	0,20 mg/Kg
Zinc (Óxido de zinc) (E-6)	115,00 mg/Kg
- Enzimas y Digestivos	
Endo-1,3(4) beta-glucanasa (EC 3.2.1.6) (E-1636)	17.500,00 BU/Kg
3-Fitasa (EC 3.1.3.8) (E-1632)	500,00 PPU/Kg
Endo-1,4-beta-Xilanasa (EC 3.2.1.8) (E-1604)	24.001,45 U/Kg
- Ligantes / Antiaglomerantes	
Sepiolita (E-562)	3,26 gr/Kg
- Vitaminas, provit. y sust. químicamente definidas de efecto análogo	
Vitamina A (E-672)	10.000,00 IU/Kg
Vitamina D3 (E-671)	2.000,00 UI/Kg

Data de fabricació: fabricat 6 mesos abans de la data de durabilitat
Data límit de durabilitat "utilitzar abans de : 20-11-2017
Nº AUTORITZACIO: alfa-ESP25100467
LOT –1705200955-PIGGY **PES NET: 25 KG**

UTILITZACIÓ RESERVADA EXCLUSIVAMENT PER ALIMENTACIÓ ANIMAL Conservar en lloc fresc, sec i sense llum. No emmagatzemar a temperatures superiors a 30º

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B_PRESTARTER PORCS

CONTROL

PINSO COMPLET per l'espècie PORCINA presentat en forma de farina

MODO DE EMPLEO:

Administrar desde las 3 hasta las 6 semanas de vida (de 7 kg. a 10 kg. de peso vivo aprox.), a libre disposición, procurando que los animales dispongan de agua en todo momento.

COMPOSICIÓN

Maíz modificado genéticamente, Trigo, Harina de extracción de soja tostada y decorticada (producida a partir de haba de soja modificada genéticamente), Cebada, Alimento de harina de (habas de) soja extrusionada y decorticada (producida a partir de haba de soja modificada genéticamente), Fosfato monocálcico, Grasas animales, Carbonato de calcio, Cloruro de sodio, Aceite vegetal de soja (producico a partir de habas de soja modificada genéticamente)

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Calcio	0,58 %
Metionina	0,49 %
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- Compuestos de Oligoelementos	
Cobre (Quelato cúprico de aminoácidos hidratado) (E-4)	100,00 mg/Kg
Hierro (Sulfato ferroso monohidratado) (E-1)	100,00 mg/Kg
Iodo (Ioduro potásico) (E-2)	2,00 mg/Kg
Manganeso (Óxido de manganeso) (E-5)	100,00 mg/Kg
Selenio (Selenito sódico) (E-8)	0,20 mg/Kg
Zinc (Óxido de zinc) (E-6)	115,00 mg/Kg
- Enzimas y Digestivos	
Endo-1,3(4) beta-glucanasa (EC 3.2.1.6) (E-1636)	17.500,00 BU/Kg
3-Fitasa (EC 3.1.3.8) (E-1632)	500,00 PPU/Kg
Endo-1,4-beta-Xilanasa (EC 3.2.1.8) (E-1604)	24.001,45 U/Kg
- Ligantes / Antiaglomerantes	
Sepiolita (E-562)	3,26 gr/Kg
- Vitaminas, provit. y sust. químicamente definidas de efecto análogo	
Vitamina A (E-672)	10.000,00 IU/Kg
Vitamina D3 (E-671)	2.000,00 UI/Kg

Data de fabricació: fabricat 6 mesos abans de la data de durabilitat
Data límit de durabilitat "utilitzar abans de : 20-11-2017
Nº AUTORITZACIO: alfa-ESP25100467
LOT –1705200950-CONTROL **PES NET: 25 KG**

UTILITZACIÓ RESERVADA EXCLUSIVAMENT PER ALIMENTACIÓ ANIMAL Conservar en lloc fresc, sec i sense llum. No emmagatzemar a temperatures superiors a 30º

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Pienso medicamentoso
PRESCRIPCIÓN VETERINARIAPremezclas medicamentosas:ZINTESTIN -OXID DE ZINC 1600 ESP oxid de zinc 1.000mg/g 2.500ppm; AMOXIPOL 200 mg/g 2943 ESP amoxicilina 200mg/g 300ppm; NEOMICINA 100 g/kg MAYMO 736-ESP neomicina 100mg/g 200ppm; Observaciones:Administrar juntamente con agua limpia y abundante; Tiempo de espera: 28 días; Afección: COLIBACILOSIS I NEUMONIA

B_STARTER PORCS

PINSO COMPLET per l'espècie PORCINA presentat en forma de farina

MODO DE EMPLEO:

Administrar desde las 10 hasta las 12 semanas de vida (de 25 kg. a 35 kg. de peso vivo aprox), a libre disposición, procurando que los animales dispongan de agua en todo momento.

COMPOSICIÓN

Maíz modificado genéticamente, Trigo, Harina de extracción de soja tostada y decorticada (producida a partir de haba de soja modificada genéticamente), Cebada, Fosfato monocálcico, Carbonato de calcio, Cloruro de sodio

COMPONENTES ANALITICOS	
Proteína Bruta	17,10 %
Aceite Y Grasas Brutos	2,95 %
Ceniza Bruta	5,00 %
Fibra Bruta	3,40 %
Lisina	1,27 %
Fósforo	0,59 %
Calcio	0,58 %
Metionina	0,49 %
Sodio	0,20 %
ADITIVOS	
- Compuestos de Oligoelementos	
Cobre (Quelato cúprico de aminoácidos hidratado) (E-4)	100,00 mg/Kg
Hierro (Sulfato ferroso monohidratado) (E-1)	100,00 mg/Kg
Iodo (Ioduro potásico) (E-2)	2,00 mg/Kg
Manganeso (Óxido de manganeso) (E-5)	100,00 mg/Kg
Selenio (Selenito sódico) (E-8)	0,20 mg/Kg
Zinc (Óxido de zinc) (E-6)	115,00 mg/Kg
- Enzimas y Digestivos	
Endo-1,3(4) beta-glucanasa (EC 3.2.1.6) (E-1636)	17.500,00 BU/Kg
3-Fitasa (EC 3.1.3.8) (E-1632)	500,00 PPU/Kg
Endo-1,4-beta-Xilanasa (EC 3.2.1.8) (E-1604)	24.001,45 U/Kg
- Ligantes / Antiaglomerantes	
Sepiolita (E-562)	3,26 gr/Kg
- Sustancias aromáticas	
Neohesperidina dihidrochalcona (E-959)	3,00 mg/Kg
Sacarina de sodio (E-954(iii))	87,00 mg/Kg
- Vitaminas, provit. y sust. químicamente definidas de efecto análogo	
Vitamina A (E-672)	10.000,00 IU/Kg
Vitamina D3 (E-671)	2.000,00 UI/Kg

Data de fabricació: fabricat 6 mesos abans de la data de durabilitat

Data límit de durabilitat "utilitzar abans de : 30-11-2017

Nº AUTORITZACIO: alfa-ESP25100467

LOT –1705302025 **PES NET: 25 KG**

UTILITZACIÓ RESERVADA EXCLUSIVAMENT PER ALIMENTACIÓ ANIMAL Conservar en lloc fresc, sec i sense llum. No emmagatzemar a temperatures superiors a 30º

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B_STARTER PORCS

CONTROL

PINSO COMPLET per l'espècie PORCINA presentat en forma de farina

MODO DE EMPLEO:

Administrar desde las 10 hasta las 12 semanas de vida (de 25 kg. a 35 kg. de peso vivo aprox.), a libre disposición, procurando que los animales dispongan de agua en todo momento.

COMPOSICIÓN

Maíz modificado genéticamente, Trigo, Harina de extracción de soja tostada y decorticada (producida a partir de haba de soja modificada genéticamente), Cebada, Fosfato monocálcico, Carbonato de calcio, Cloruro de sodio

COMPONENTES ANALITICOS

Proteína Bruta	17,10 %
Aceite Y Grasas Brutos	2,95 %
Ceniza Bruta	5,00 %
Fibra Bruta	3,40 %
Lisina	1,27 %
Fósforo	0,59 %
Calcio	0,58 %
Metionina	0,49 %
Sodio	0,20 %

ADITIVOS

- Compuestos de Oligoelementos	
Cobre (Quelato cúprico de aminoácidos hidratado) (E-4)	100,00 mg/Kg
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Endo-1,4-beta-Xilanasa (EC 3.2.1.8) (E-1604)	24.001,45 U/Kg
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Neohesperidina dihidrochalcona (E-959)	3,00 mg/Kg
Sacarina de sodio (E-954(iii))	87,00 mg/Kg
- Vitaminas, provit. y sust. químicamente definidas de efecto análogo	
Vitamina A (E-672)	10.000,00 IU/Kg
Vitamina D3 (E-671)	2.000,00 UI/Kg

Data de fabricació: fabricat 6 mesos abans de la data de durabilitat

Data límit de durabilitat "utilitzar abans de : 30-11-2017

Nº AUTORITZACIO: alfa-ESP25100467

LOT –1705301953-CONTROL **PES NET: 25 KG**

UTILITZACIÓ RESERVADA EXCLUSIVAMENT PER ALIMENTACIÓ ANIMAL Conservar en lloc fresc, sec i sense llum. No emmagatzemar a temperatures superiors a 30º

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Pienso medicamentoso

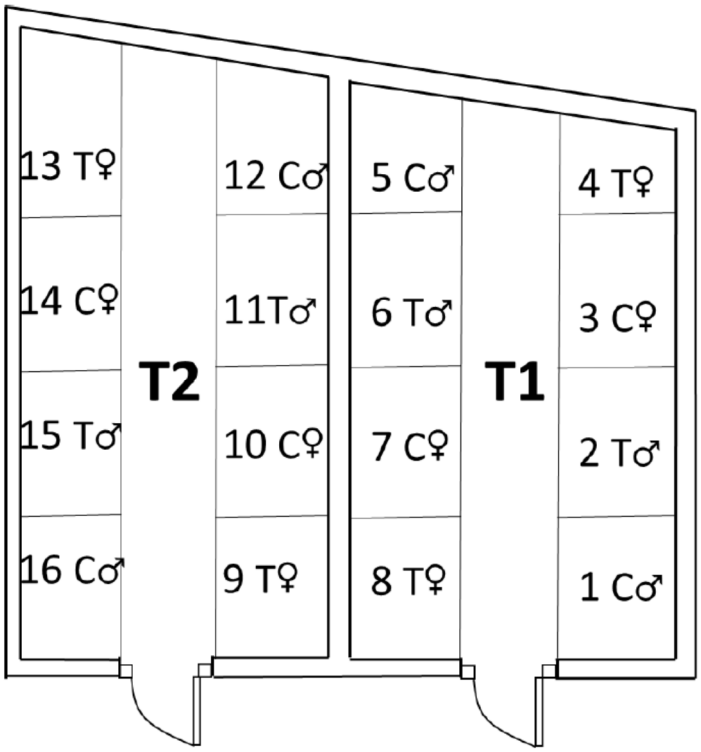
PRESCRIPCIÓN VETERINARIAPremezclas medicamentosas:AMOXIPOL 200 mg/g 2943 ESP amoxicilina 200mg/g 300ppm; Observaciones:Administrar juntamente con agua limpia y abundante; Tiempo de espera: 12 días; Afección: INFECC. ESTREPTOCOSICA

3.4. Data Collection Methodology

A few days before the start of the experiment, the stables/boxes were disinfected in order to guarantee the best hygienic conditions. These were pre-heated to ensure an appropriate temperature upon entry for the animals.

After stabling the animals at the Centre d'Estudis Porcins, they were marked with collars with plastic numbers. All animals were weighed and evenly divided by sex and weight. It was verified that there were no significant weight differences per box.

Figure 7 shows the distribution in the corresponding box numbers (1-16), letter code of the treatment (control (C) or test (T)), and the symbol indicating the sex (female or male).



Day 1 (30.05.2017): This was the first control and study day. The feed was administered in the conventional amount, and all pigs were weighed.

Day 14 (13.06.2017): The remaining feed was collected and deducted from the 14-day consumption. The average per animal and day resulted from the effective consumption divided by the animals and number of consumption days. All animals were weighed.

Day 28 (27.06.2017): The remaining feed was collected and deducted from the 14-day consumption. The average per animal and day resulted from the effective consumption between controls, divided by the animals and number of consumption days. All animals were weighed.

Day 42 (11.07.2017): The remaining feed was collected and deducted from the 14-day consumption. The average per animal and day resulted from the effective consumption between controls, divided by the animals and number of consumption days. All animals were weighed.

Daily:

- The state of health of the animals was checked.
- The ambient climate (temperature and humidity) was monitored from the outside by one data logger per stable.
- The water consumption per box was monitored.
- Feed portions were monitored.

Measured data:

- 14-day weight per animal
- 14-day weight per group
- 14-day feed consumption per box
- Animals with problems, daily (with guidance on treatment)
- Daily incidents

3.5 Data Analysis Methodology

Using the statistics program JMP Statistical Discovery™ from SAS, various models were run, both for total results (Table 5) and for 14-day results (Tables 6, 7, 8 and 9). It should be noted that there were initially four culls in the treatment group, which was taken into account in the tables.

ANOVA analysis have been made with the same standard and taking into account the standard error from the t Student for $p<0,05$. The treatment has been considered as the model and, as a variable, each of the technical parameters to study.

4. Results and Discussion

Table 5 shows the results over the entire test period.

The performance of both groups is very similar.

There are no significant differences in the overall results.

Table 5:

Total					
	Control		Test		significance
	N=40		N=36		
	LSM	SE	LSM	SE	
Initial weight	5.686	0.106	5.807	0.112	NS
End weight	17.757	0.521	17.597	0.550	NS
Total weight gain	482.840		424.420		
Weight gain (kg/animal)	12.071	0.475	11.784	0.501	NS
Daily gains (g/day)	287.404	11.331	280.701	11.944	NS
Total feed consumption (kg)	843.065		739.545		
Consumption/animal (kg)	21.076	0.334	20.543	0.352	NS
Consumption/animal per day	501.824	7.953	489.117	8.383	NS
Feed conversion	1.746	0.010	1.742	0.011	NS

The data were broken down into the 14-day periods to see how the different variables developed during the periods.

In the first 14 days, the test group consumed less feed, which had a negative impact on performance (daily gain and feed conversion). In the subsequent periods, the test group caught up, so that the final results showed no significant differences in daily gains and feed conversion between the control group and the test group.

Table 6:

PERIOD 0					
	Control		Test		significance
	N=40		N=36		
	LSM	SE	LSM	SE	
Weight Start (kg)	5.686	0.106	5.749	0.106	NS

Table 7:

PERIOD 1					
	Control		Test		significance
	N=40		N=36		
	LSM	SE	LSM	SE	
Weight 14 days (kg)	9.037	0.235	8.361	0.241	*
Weight gain (kg/animal)	3.351	0.175	2.612	0.179	*
Daily gains (g/day)	239.375	12.501	186.571	12.826	*
Feed consumption (kg)	20.608	1.023	16.323	1.023	*
Consumption/animal (kg)	4.121	0.193	3.387	0.193	*
Consumption/animal per day	294.401	13.812	241.928	13.812	*
Feed conversion	1.229	0.023	1.296	0.023	*

Table 8:

PERIOD 2					
	Control		Test		significance
	N=40		N=36		
	LSM	SE	LSM	SE	
Weight 14 days (kg)	12.425	0.316	11.966	0.333	NS
Weight gain (kg/animal)	3.387	0.220	3.373	0.228	NS
Daily gains (g/day)	241.946	15.717	240.928	16.342	NS
Feed consumption (kg)	34.521	1.415	30.270	1.415	NS
Consumption/animal (kg)	6.904	0.227	6.778	0.227	NS
Consumption/animal per day	493.142	16.277	484.142	16.277	NS
Feed conversion	2.038	0.077	2.009	0.077	NS

Table 9:

PERIOD 3					
	Control		Test		significance
	N=40		N=36		
	LSM	SE	LSM	SE	
Weight 14 days (kg)	17.757	0.521	17.597	0.550	NS
Weight gain (kg/animal)	5.332	0.246	5.631	0.259	NS
Daily gains (g/day)	380.857	17.610	402.214	18.563	NS
Feed consumption (kg)	50.253	2.691	45.849	2.691	NS
Consumption/animal (kg)	10.050	0.508	10.287	0.508	NS
Consumption/animal per day	717.901	36.354	734.785	36.354	NS
Feed conversion	1.884	0.039	1.826	0.039	NS

5. Contact

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