Applying additives VevoVitall and CRINA in rations for finishing pigs and sows

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Introduction

Ammonia emissions, a particular feature of pig production, pollute not only the environment, but also affect the health of humans and animals. Reduction of ammonia therefore represents an important target in farm management. In the feed industry, however, the polluting gases emitted from animals and their surroundings are not usually the first concern. Much greater attention is given to achieving target animal performance.
By applying different feeding systems it is possible to positively influence both factors: feeding performance and ammonia emission reduction. Regarded as effective in this respect is feed supplementation with additives VevoVitall® (99.9% benzoic acid) and CRINA® Finishing Pigs & Sows (a formulation of selected essential oil components).

The organic acid have attracted considerable interest in animal nutrition since the ban on antibiotic growth promoters in feed. Their inclusion leads to a reduction in bacteria density in the small intestine and thus to an increase in the livestock performance potential. Benzoic acid is declared as "other zootechnical feed additives" and finds particular application in pig feeding. Its special metabolism means it has the capability of reducing urine pH and this is associated with a reduction of ammonia emissions from urine and manure.

The mix of essential oil components is understood to stimulate release of digestion enzymes in monogastric animals and, through this, markedly improve feed conversion performances. Additionally, a positive influence on intestine flora is postulated and this also encourages improved feed conversion performance.

Materials and methods

Animals
Involved in the trial were 176 feeding pigs (Pi x (DE x DL)). The pigs were divided into four variant groups and fed in a parallel procedure in four identical compartments (one pen per variant). Due to ill health, eight of the trial animals did not feature in the end results.

Feeding
Two-phase feeding was carried out during the trial. From approximately 30 to 70 kg liveweight, all pigs received a feeder starter ration. This was followed by an end phase ration through to completion of the trial when the pigs reached a slaughter weight of approx. 115 kg. The feed variants were as follows:

A) Control (standard pig rations)
B) A plus 0.5% VevoVitall (benzoic acid) throughout total feeding period
C) A plus 0.5% VevoVitall (benzoic acid) to 70 kg liveweight (LW) with no VevoVitall during the final feeding phase
D) A plus 0.3% VevoVitall (benzoic acid) + 75 ppm CRINA Finishing Pigs & Sows

The rations were industrially mixed and made available as complete feed. In the trial rations were fed *ad libitum* via automatic feeding stations (Insentec).

Presented in table 1 is the nutritional values of the different feeds as analyzed. The figures indicate a good agreement (in feed nutritional value) between the feed groups, as well as an agreement, within acceptable error tolerances, with the calculated values. They were also appropriate for the physiological requirements of the respective weight groups.

Trial parameters
The following key values were determined:

- Feeding performance: live weight at beginning of trial, at feed phase change and at end of trial, daily weight gain, feed consumption, feed conversion, losses.
- Slaughter results: carcass quality according to carcass assessment guidelines including meat drip losses.

The differences between individual results or of group averages were tested for significance using the t-test (SPSS statistic packet).

Table 1: Feed nutritional values as analyzed

		First feeding phase				End feeding phase			
		A	B	C	D	A	B	C	D
Dry matter	(%)	88.7	88.3	88.6	89.0	88.2	87.8	87.5	88.1
Crude protein	(%)	17.0	16.9	16.5	16.9	16.2	17.4	15.9	16.8
Lysine	(%)	1.02	0.98	1.00	1.05	0.84	0.94	0.85	0.88
Crude fiber	(%)	3.9	3.9	3.8	3.9	3.9	4.1	4.1	3.9
Energy	MJ ME	13.6	13.4	13.4	13.4	13.2	13.2	13.0	13.2
Ca	(%)	0.57	0.61	0.6	0.6	0.54	0.6	0.56	0.57
P	(%)	0.49	0.48	0.48	0.47	0.43	0.45	0.44	0.45

Results and discussion

Feeding performance results:
Table 2 presents the recorded results of performances during feeding.

The starting weights of the four groups (at beginning of trial) were comparable with no significant differences.
The live weights at the end of the trial lay within the normal range with no significant individual differences. The limited differences in weights that were recorded at this stage were due to slaughtering being carried out only once per week.

Table 2: Feeding performances

	A n =41		**B** n = 43		**C** n = 41		**D** n = 43	
	$\bar{x}$	S	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
Trial start live weight (kg)	30.1	2.7	30.8	3.4	30.6	3.3	30.6	3.3
Live weight end of first feeding phase (kg)	72.2	9.2	75.8	9.0	79.1	1.2	77.4	7.8
Live weight end of trial (kg)	114.2	5.0	116.0	4.2	116.6	4.1	116.7	4.2
Weight gain in first phase (g/d)	772^{a}	105	824^{b}	126	892^{c}	98	862^{bc}	102
Weight gain in end phase (g/d)	876^{ab}	118	902^{a}	123	847^{b}	118	895^{ab}	165
Total trial weight gain (g/d)	823^{a}	84	861^{b}	101	874^{b}	80	874^{b}	93
Feed consumption First phase (kg/day)	1.88^{ab}	0.26	1.94^{a}	0.3	2.10^{c}	0.32	1.84^{b}	0.39
Feed consumption End phase (kg/day)	2.76^{ab}	0.38	2.81^{a}	0.36	2.78^{ab}	0.36	2.63^{b}	0.41
Total feed consumption (kg/day)	2.29^{ac}	0.25	2.33^{a}	0.26	2.41^{a}	0.28	2.20^{bc}	0.34
Feed conversion First phase (kg/kg)	2.43^{a}	0.18	2.37^{a}	0.19	2.37	0.28	2.15^{b}	0.45
Feed conversion End phase (kg/kg)	3.16^{ab}	0.3	3.13^{a}	0.26	3.30^{b}	0.42	2.98^{c}	0.47
Total feed conversion (kg/kg)	2.79^{a}	0.22	2.71^{a}	0.18	2.76^{a}	0.23	2.52b	0.33

^{a,b}: significant difference, significance level: $p < 0.05$

The daily weight gain results indicate significant differences between the control group and the trial groups. Mainly, these differences are because the control group animals (A) returned lower live weight gains during the start feeding phase. In the end feeding phase no significant differences are apparent in this respect. While higher live weight gains can be seen for groups A, B and D in the end feeding phase compared with the starter feeding phase, the end feeding liveweight increases in group C (addition of VevoVitall only in the starter feed phase) are lower than those recorded during the starter feeding phase.

The higher weight gains for the groups B and C compared to the control can be attributed to higher feed consumption. Hereby, there is no differences between the groups in feed conversion performances. Contrary to this, the animals in feed group D (CRINA FP&S + VevoVitall) achieved, with the same feed consumption, a significantly better feed conversion of 0.25 kg/kg compared with the control group.

Slaughter results

The data for slaughter performance are presented in table 3. The slaughter weights correspond to those at the end of trial. They lie close together with no conclusions therefore possible as to their influence on respective carcass lean meat percentages. Additionally, lean meat percentages are comparable in the four groups, with no significant differences. Only the results from the animals in group C in general tend to show lower lean meat percentages compared with those in the control group A.

Table 3: Slaughter data

	A n =41		**B** n = 43		**C** n = 41		**D** n = 43	
	$\bar{x}$	S	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	S
Slaughter wt. (kg)	89.1	4.1	90.5	2.9	91.1	3.5	91.0	3.5
Killing-out (kg)	77.9	1.5	77.9	1.3	78.0	1.4	77.8	1.4
Lean meat (Bonn formula) (%)	58.7	3.4	57.8	2.4	57.4	3.1	57.7	3.1
Backfat (mm)	2.17	0.39	2.23	0.41	2.38	0.42	2.33	0.48
Fat area (cm^2)	16.46	3.45	16.86	3.22	16.99	3.36	16.85	3.60
Lean meat area (cm^2)	52.21	4.96	49.73	5.0	51.22	4.14	50.48	4.93

Conclusions

All trial groups in this research achieved significantly higher weight gain results than the animals in the control group. The improvements lay between 40 and 50 g per day. These improvements can be attributed to higher feed consumption by the groups B and C. The animals in group D achieved their higher weight gains, on the other hand, through significantly better feed conversion. Compared with control, these animals required around 0.25 kg less feed to achieve each 1 kg increase in bodyweight. This resulted in these animals achieving a better margin over feed costs, one which was approximately €7 higher.

Literature upon request

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