In-feed probiotic versus sub-therapeutic antibiotics

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There is growing legislation pressure to phase out the routine feeding of food animals with low level of antibiotics as feed additives.

The European Union has already imposed a total ban of antibiotic growth promoters with effect from January 2006. Thus, alternative solutions should be evaluated in the meanwhile.

Antimicrobials, when used as growth promoters, are claimed to improve daily gain by 3-9% and feed utilisation by 2-7%, with fewer scour problems. For this reason they are customarily used in pigs even on high health status farms. They appear to act by reducing the number of pathogenic bacteria and modifying the microflora in the gut, providing more nutrient availability for the animal itself and less substrate for the bacterial organisms to use for their own growth.

Despite these beneficial effects, recent concerns regarding the presence of drug residues in edible animal products and the environment, and the potential transfer of antibiotic resistance to human pathogens has directed research towards alternative solutions such as probiotics.

Probiotics are live cultures of harmless micro-organisms that beneficially effect the balance of the intestinal microflora of the animal. They may promote growth by competing with harmful gut flora and by stimulating the immune system of the animal and, therefore, increasing its resistance to infectious agents.

Several studies have shown that average daily weight gain (ADG) and feed conversion ratio (FCR) are significantly improved after probiotic treatment. The following part of this article describes a study to examine the ability of probiotics to act as a substitute for growth promoting antibiotics on the health and productivity of weaned pigs in one farm with high health status.

Materials and methods

The study was carried out on a commercial three site production farm of 1,600 sows in Minnesota, USA.

All breeding animals were of the same breed and they were vaccinated against Aujeszky's disease, porcine reproductive and respiratory syndrome, parvovirus infection, erysipelas, leptospirosis and E. coli. The piglets on the farm were weaned in weekly batches of 520 animals at the age of 20 days and, after separation by gender and bodyweight, were transferred to two adjacent off-site nurseries, where they remained until the age of 64 days.

Each nursery contained four small rooms of 16 pens, and two large rooms of 32 pens, with approximately 22 pigs per pen.

The nursery rooms were filled sequentially one after another, and each small room contained pigs of the same week of age, or of two sequential weeks of age in the large rooms. A common outer corridor connected the rooms in each nursery, and foot-dips in the corridor outside each room were used before personnel entered.

A separate feed bin supplied each room. The pigs were fed ad libitum rations containing low doses of antibiotics – 400ppm neomycin for the first 5-7 days postweaning, 100ppm neomycin plus 100ppm oxytetracycline for the next seven days, and thereafter with 20ppm tylosin up to the age of 70 days. Post-weaning mortality in the nurseries was historically low (<2%).

To test the effects of probiotics as compared with sub-therapeutic antibiotics, the product BioPlus® 2B (Chr Hansen A/S) was used instead of the antibiotics. BioPlus 2B is a thermo-tolerant probiotic registered in the European Union for piglets, sows and grower, finisher pigs. The product was included in the usual rations of nursery period corresponding to 400g/tonne of complete feed.

Some 42 nursery rooms were used chronologically but in an alternate mode, for example, the pigs of first room received feed with probiotics, those of the second room feed with antibiotics, those of the third room feed with probiotics, and so on. At the end of the trial, the two treatment groups were compared, that is, pigs receiving the usual feed that contained antibiotics (21 rooms), and pigs receiving the same type of feed but containing probiotics instead of antibiotics for the same period (21 rooms). As shown in Table 1, the average age and bodyweight of the pigs between the groups did not differ significantly at the beginning of the trial.

Mortality and reasons of death were recorded by the farmer for each group of pigs up to the end of the nursery period. At that time, the piglets were weighed again. The feed consumption per group was also recorded during this period, and the ADG and the FCR were calculated.

Parameter	Antibiotic	Probiotic
Age at entry (days)	18.86 (±0.73)	18.86 (±0.79)
Period in (days)	46.10 (±4.05)	47.19 (±4.02)
Mortality rate (%)	2.33 (±1.50)	1.97 (±1.35)
Entry weight (kg)	5.52 (±0.54)	5.56 (±0.59)
Moved out weight (kg)	26.02 (±1.87)	26.24 (±1.93)
Dead pig weight (kg)	9.24 (±2.83)	7.90 (±1.63)
Daily gain (kg)	0.425 (±0.023)	0.423 (±0.021)
Daily feed intake (kg feed)	0.621 (±0.071)	0.642 (±0.072)
Feed conversion ratio	1.48 (±0.18)	1.54 (±0.16)

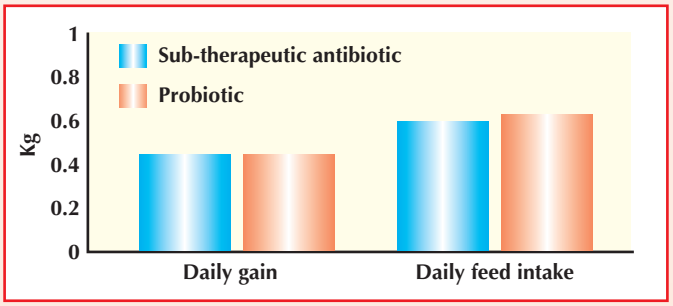
Table 1. Health and growth performance in groups of nursery pigs fed sub-therapeutic doses of antibiotics or probiotic.

Results

The results shown in Table 1 were derived from a total of 10,955 pigs in 21 probiotic rooms, and 10,800 pigs in 21 antibiotic rooms.

In both treatment groups, the nursery periods had the same average length. The bodyweight of pigs at the end of the nursery period, the ADG, ADFI and FCR were similar for both groups – P>0.05 (Fig.1). There was no difference in mortality rate, and causes of mortality appeared to be the same for both groups.

Fig. 1. The effect of probiotic and sub-therapeutic antibiotics on piglet performance.



Discussion

These results show that probiotics can perform similarly to antibiotics in weaned pigs in high health status farms.

Thus, farmers may be able to maintain the performance of their nursery pigs while reserving antibiotics administered through feed for therapy or the prevention of more serious health conditions.

The present study indicates that probiotics may be substituted for feed based antibiotics in high health nurseries without causing any negative pig health or productivity consequences. ■

Kritas S. K. and Morrison R. B. (2004). Can probiotics substitute for subtherapeutic antibiotics? Proceedings of the 18th International Pig Veterinary Society Congress, Hamburg: 739.