

Pork CRC Initiatives APN April 2016

by Dr Roger Campbell, Pork CRC CEO

State of the States: US Update

I recently returned from the Animal Science meetings in Des Moines, Iowa, USA, where the latest in pig and pork research is presented and discussed and where you catch up with what is happening commercially in the industry.

Last year the issue was antibiotics and new Food & Drug Administration (FDA) regulations concerning antibiotic use in animal agriculture. The new regulations came into effect on January 1 this year and really relate to the more judicious use of antibiotics. The FDA has published a list of antibiotics considered important in human medicine and their use must be determined and scripted by veterinarians for specific use in animal agriculture and drug companies must remove any growth promoting claims for most of their antimicrobial products. Carbadox, ionophores, polypeptides, bambarmycin and pleuromutilin are exempt. If you want more detail on the new rules let me know.

This year there were several presentations on alternatives to antibiotics, as you might expect, but no other real outstanding industry issues. PEDv seems a thing of the past, but never say never and as of March 2016 no new disease has been detected in the USA, but PRRS remains a challenge and one of the reasons antibiotics are needed in the pork industry.

Price remains constrained by supply and like 2015, margins in 2016 will be tight, but slightly positive.

In listening to the presentations on reproduction it appears total born and born alive ranges from 13-14 and 12.5-13.5 respectively, with the better herds achieving higher figures and better farrowing rates than the average.

Sow survey

A survey of producers in 2014 compared the reproductive performance of sows housed in stalls during gestation with those housed in groups and fed with ESFs. To be fair, there were some 565 farms (nearly one million sows) with stall housing and only 17 farms (53,000 sows) housed in groups (pens) with ESFs. Of those using group housing, 46% grouped the sows immediately after mating. The remainder probably grouped the sows some 35 days after mating.

Trumping us

The results are summarised in Table 1, which puts the US industry in perspective and suggests they are probably not yet as far ahead of us as some might want you to believe and they are achieving 25+ pigs weaned/sow through earlier weaning rather achieving much higher born alive than us.

Table 1 Average reproductive performance of sows housed in stalls of in pens (groups) with ESFs

Housing	Stall	Pen/Group
Pigs weaned/sow/y	25.72	24.1
Farrowing rate (%)	85.9	85.3
Total born	13.82	13.52
Born alive	12.6	12.4
Weaning to first service (d)	6.59	6.23
Weaning age (d)	20.3	20.8
Pre weaning mortality (%)	13.7	17.7

I probably heard more on tail biting at the meeting than on any previous visit to the USA. Summer infertility was also a discussion point and covered in a number of presentations – but no real answers to either ‘problem’, but some very novel work on welfare and tail biting is being conducted in the Netherlands.

Smithfield feedback

We heard an interesting presentation from Smithfield on customer and consumer demand and opinions on pork with antibiotics or the lack of them ranking highly with customers and consumers and animal welfare changes driven entirely by customers with ‘support’ from activist groups, but ranking much lower with consumers. We also heard how Smithfield has changed to group housing of pregnant sows (grouped at 35-42 days after mating) and given they own some one million sows their choice of small (6-12 sows/group) static groups may surprise you, but I will expand on this and customer and consumer perceptions and desires in a future column.

Antibiotic alternatives

This month I have decided to summarise for you the session on antibiotic alternatives. There are plenty of them, with one or two showing some promise.

The session on antibiotic alternatives covered yeasts, pre and pro biotics, essential oils, other phytobiotics and a little on antimicrobial peptides. I think the latter technology has good potential and is one that is developing quite quickly and it’s an area that you might want to keep an eye on. Results for most of the other strategies could best be described as variable, although I’m sure research will continue to be supported, largely by companies involved in the development of these various alternatives.

In other sessions we heard that Celmanax SCP, an enzymatically hydrolysed yeast product containing yeast culture and other complex carbohydrates, reduced mortality when included in the diet offered grower-finisher pigs at 0.02% from 7.5% to 2.8% and this was in response to two disease challenges during the study. The first challenge was associated with PRRS, which we don’t have. The second challenge was associated with ileitis, which we do have. There may be something in this, but to put it in perspective, the Celmanax was tested at four levels, namely zero, 0.01, 0.02 and 0.04%. The corresponding mortality levels during the study were 7.5%, 6.7%, 2.8% and 4.3%.

In a study with weaner pigs, the same product investigated at the same levels of inclusion had no effect on animal performance but improved immune responsiveness. There was no disease challenge in the weaner study.

Lysozyme revisited

One of the other promising outcomes came from using Lysozyme in two weaner studies.

Lysozyme is a naturally occurring enzyme found in bodily secretions and part of the innate immune system in most mammals. Lysozyme has GRAS (Generally Recognised As Safe) status with FDA.

The results of two studies were reported at the meetings, both conducted by the USDA.

The first was a smaller study involving pigs weaned at 24 days of age and offered three dietary treatments. A control diet without antibiotics, the same diet containing Carbadox at 55 mg/kg and CuSo₄ at 150 mg/kg and a third treatment involving the same basal diet plus 100 mg/kg Lysozyme (Entegard).

Bottom line

Bottom line was pigs offered the diets containing the antibiotic and CuSO₄, or Lysozyme, grew significantly faster and exhibited 12-14% better feed efficiency ($P < 0.05$) than pigs offered the control diet. Lysozyme and the antibiotic treatment also significantly increased villus height in the jejunum, suggesting improved growth may have been associated with improved nutrient absorption. However, it needs to be remembered that changes in the gastrointestinal tract structure (and bacterial populations) and even in the immune system, are not always associated with changes in growth performance and animal health and vice versa.

Immune challenges

In a larger study the researchers investigated similar treatments in pigs weaned at 26 days of age, but housed in a clean or dirty nursery. The dirty nursery was not cleaned between batches of pigs.

The treatments within each housing environment were:

1. Control diet
2. Antibiotic-control diet plus Chlortetracycline (55 mg/kg) and Denegard (1.65g/kg)
3. Lysozyme-control diet plus 100mg/kg Lysozyme (Entegard)

The study was of 28 days duration.

Both the antibiotics and Lysozyme significantly improved growth rate and feed efficiency. Pigs housed in the clean nursery also exhibited better feed efficiency than those in the dirty nursery, but there was no interaction between the effects of the dietary treatment and housing on any measure of growth performance.

The results for feed efficiency are shown in Table 2

Table 2 Effects of clean and dirty housing and the inclusion of antibiotics or Lysozyme in the diets offered pigs for 28 days after weaning on feed efficiency.

Housing and diet	Gain: Feed
Clean	
Control	0.655
Antibiotics	0.690
Lysozyme	0.674
Dirty	
Control	0.625
Antibiotics	0.683
Lysozyme	0.662
Significance (P=)	
Diet	0.005
Housing	0.049
Interaction	0.389

The proportional improvement elicited in feed efficiency by the antibiotics and Lysozyme was similar and largely unaffected by the housing conditions. For feed efficiency there was no interaction between housing and the dietary treatment but feed efficiency was poorer in the dirty nursery and the magnitude of the improvement elicited by the dietary treatments tended to be larger in the dirty nursery or under greater immune challenge.

Interestingly the researchers found that the incidence of Campylobacter coli shedding increased from 40% to 80% of pigs over the 28 day nursery period for pigs offered the control and antibiotic supplemented diets, but this increase in shedding was prevented by Lysozyme.

Lysozyme is not a new 'product' or material, but given the increased pressure on antibiotic use is being investigated in a new light in the USA and these results suggest it may have potential as an alternative to antibiotics or maybe antimicrobial type growth promotants in pig diets.

I will follow the research by USDA (and others) closely from now on and keep you updated on the outcomes.

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