Pork CRC Initiatives April 2018 – by Pork CRC CEO, Dr Roger Campbell

Sizing up mortality matters in the USA

I recently attended the 2018 Mid-West American Society of Animal Science meeting in Omaha, Nebraska, USA.

While there's not much to see in Omaha, the meetings were very active and informative and I have summarised a few highlights for you. These relate to the effects of dietary phosphorus (P) and calcium (Ca) on the performance of grower pigs and the responses of lactating sows and their litters to dietary lysine.

There is some money in the US pork industry, with margin being positive in 2017 ($11.98/pig) and averaging $14/pig for the first two months of 2018. COP in 2018 averaged $1.28 USD per kg carcass weight. The corresponding COP in Australian dollars is $1.69/kg carcass weight. How the economics of the industry might be affected by the raging tariff war with China remains to be seen.

Mortality matters

The issue at the meetings was mortality. They are experiencing problems keeping piglets from large litters alive, with pre-weaning mortality 16% and above. A new problem is sow prolapses and mortality, with herds experiencing up to 20% sow mortality. Dean Boyd believes this is related to mycotoxin contamination of soybean meal and corn. Others think it is a carryover from PEDv experienced a couple of years ago. Regardless, it was the main issue at the meeting. Wean-finish mortality remains at 9-10%, so, overall, many animals are being lost through the system, hence the National Pork Board is investing a lot in trying to resolve the problem with sows.

Also evident during the meetings was the low level of lactation feed intake reported for gilts and sows. In some studies this averaged below 5 kg/day and was rarely above 6.2 kg/day, which may support Dean's contention that sow problems are associated with mycotoxins.

Big feedback

General feedback from producers and researchers was that big litter size isn't necessarily an advantage and most would prefer 13 good size pigs born alive than 15 and 15+ with too many small, non-viable piglets. This is something to keep in mind and hopefully new PIC genomic technology may assist here. Having said that, the number weaned in most sow presentations was between 11.5 and 13, which we would be happy to achieve.

Sexy semen

I sensed a push towards more efficient AI, with post cervical AI now approaching 70% across the industry and a number of groups investigating, or re-investigating, deep uterine AI. The latter seems to be driven by a desire to use sexed semen. The sexed semen technology has been developed or revised by Fast Genetics, founded in 1982 by the Fast family in Saskatchewan, Canada. The technical principal behind separating sperm is based on the DNA difference between sperm cells. X-bearing sperm cells contain slightly more DNA than Y-bearing sperm cells. According to Fast Genetics, as sperm cells flow through the sorter, their proprietary software detects the difference between X-bearing and Y-bearing sperm cells. Sperm cells are then separated based on their DNA difference, resulting in sex sorted sperm up to 99% gender-biased accuracy.

Check levels

University of Illinois Researchers investigated the effects of dietary Ca levels at three levels of digestible P on the performance of pigs between 50 and 85 kg.

They tested three levels of digestible P (0.14, 0.27, or 0.41% STTD P), each at five levels of digestible Ca (0.13, 0.25, 0.38, 0.50, or 0.63%).The corresponding total Ca levels were 0.18,0.38.0.59,0.80 and 1.00% respectively. The recommended digestible P level for grower pigs is 0.27% (NRC 2012).

On the low and adequate levels of digestible P, growth rate was depressed when digestible Ca exceeded 0.25 and 0.38% respectively and pigs fed diets with the lowest P level grew slower at all Ca levels than those fed the P adequate diets.

P first

The Message – get the P levels correct and watch the Ca: P ratio.

On the higher level of digestible P, pigs grew at similar rates to those fed the adequate diets, but growth rate tended to increase with increasing dietary Ca.

Feed efficiency declined linearly with increasing Ca for pigs fed the low P diet and was largely unaffected for pigs fed the adequate P diet (FCR averaged 2.65). However, feed efficiency improved linearly with increasing Ca in pigs fed the higher P diets. At the two higher Ca levels, the FE of pigs fed the higher P diets (FCR averaged 2.34) was 13-15% better than for pigs fed the P adequate diets.

Bone ash increased with each increase in dietary Ca across the three P levels, but was lower at all levels in pigs fed the low P diet and higher at higher Ca levels for pigs fed the P adequate diets.

The effect of increasing Ca in the higher P diets on feed efficiency was quite 'spectacular' and may have implications for improving the feed efficiency of grower and even finisher pigs, but the P and Ca levels used in the study need to be put in context with those used commercially in Australia. Certainly worth looking at.

Sow responses

There were several presentations on the responses of lactating sows to lysine and other amino acids and one presentation on the effects of dietary lysine in gestation on reproduction. I have summarised one on lactation and the one on gestation, so you can see where we sit relative to US producers.

We are generally not that far behind and it was obvious at the meetings that reproduction varies across sites in the US, just as it does here. The best are very good and the average is good but certainly within our reach.

Lysine lactations

Researchers at Carthage, Illinois and PIC used 351 PIC Camborough sows to assess the effects on lactation performance and subsequent reproduction of SID lysine intake over a 23 day lactation.

All sows were to be fed 5.9 kg/d and dietary SID lysine levels formulated to achieve five daily SID lysine intakes - 49, 57, 65, 73, and 81 g/d.

However, sow daily feed intake did not reach the 5.9 kg/d planned. The actual intakes across the five treatments were 5.14, 5.05, 5.20, 5.19 and 5.15 kg/d resulting in SID Lys daily intakes of 42.8, 48.9, 57.4, 64.5, and 71.1, respectively.

There were no differences in wean to oestrus interval, sow weight loss, or subsequent total born across the dietary treatments.

Subsequent TB averaged 14.2. The latter is similar to what many Australian herds are currently achieving. All litters started with 12.5 piglets and weaned 11.3, which is not that different from what some of our better herds are doing.

Litter weight gain, however, improved linearly (P<0.05) with increasing lysine intake (**See Table below**)

SID Lysine intake (g/d)	42.8	48.9	57.4	64.7	71.1
Litter daily gain (kg)	2.04	2.42	2.80	3.16	3.47

The researchers did comment that the lower than expected feed intake could have caused energy intake to be a limiting factor in the study.

Nevertheless, the results clearly demonstrate SID lysine intake drives litter growth and lysine intake can be readily adjusted simply by altering the lysine content of the lactation diet. In addition, a general belief in the US is that you only need to concentrate on amino acids in lactation to minimise body protein loss.

To put the results in context, if your sows are eating 6.6kg/d in lactation, the highest lysine intake shown in the table could be achieved with a diet containing 1.07% SID lysine. The amount needed, however, will also depend on birth weight, litter size reared and lactation length.

Lysine gestations

Kansas State University researchers studied a commercial sow farm to evaluate the effects of increasing dietary standardized ileal digestible (SID) lysine in gestation on sow growth and piglet birth weight. A total of 971 females (498 gilts, 138 parity 2 and 335 parity 3+ sows; Camborough, PIC, Hendersonville, TN) were group-housed (approximately 275 females/pen) and individually fed with electronic sow feeders (ESF). Scales were located in the alleyway after the feeding stations where pigs were returning to their pens. Females were moved from the breeding stall to pens on day 4 of gestation and were allotted to 1 of 4 dietary treatments on day 5. Dietary treatments included increasing SID Lys (11, 13.5, 16, and 18.5 g/d).

The herd where the research was conducted is one of the best PIC herds in the US.

They use flat feeding from mating to the end of gestation and feed gilts and sows low levels (2.1 and 2.3 kg/d).

At start of the study, gilts and sows weighed 162 and 213 kg respectively. The corresponding weights at day 214 were 214 and 222kg.

Total born was 15.3 for gilts and 16 for sows. The corresponding born alive figures were 14.4 and 15.0 respectively.

Average piglet birth weights were 1.27 kg for gilts and 1.32 kg for sows.

They wean 13.3 piglets/litter across parities at 23 days, but it appears fostering is crucial to their success.

Increasing lysine intake through gestation increased sow weight but had no effect on piglet birth weight. The results are summarised in Table 1.

Table 1 Effects of SID lysine intake through gestation on sow weight, backfat and litter size

SID Lysine intake (g/d)	11.0	13.5	16.0	18.5	Probability Linear
Initial weight (kg)	187.2	185.8	187.2	187.0	0.777
Final weight (kg)	232.9	233.4	236.8	239.1	<0.001
Initial back fat (mm)	14.7	14.7	14.8	14.8	0.650
Final backfat (mm)	17.3	17.5	17.5	17.5	0.612
Total born	15.5	15.7	15.5	15.6	0.993
Piglet birthweight (kg)	1.28	1.27	1.29	1.28	0.574

Bottom line is that higher lysine levels for gestating gilts and sows will increase COP, but have little effect on piglet birth weight and this is a consistent message from research.

More matters

Other papers of interest included one showing that higher dietary amino acid levels reduced the impact of PRRS infection on animal performance, that extruding but not fine grinding mill mix significantly improves DE and amino acid digestibility and that using amino acid chelated minerals in diets for gilts destined for selection from weaning to parity two reduces lameness.

I will send a summary of the meetings to you all in the near future.