

Top of the table research

This month I am highlighting some very interesting research outcomes from Pork CRC Program 1 (*'Reduced confinement of sows and piglets'*), which reflect the high level of science being conducted by our researchers.

Sorting sows

The first is Project 1A-115 (*'The feeding behaviour of sows and its relationships to sow welfare and reproduction'*), conducted by Dr Megan Verdon and colleagues from the University of Melbourne and Rivalea.

Megan observed the feeding behaviour of group housed sows over two pregnancies in a system where sows were provided 2.5 kg of feed daily, delivered equally over four feed events on the floor. She found dominant/aggressive sows fed close to or under where the feed was dropped, subdominant sows fed around this area and submissive sows spent more time in areas of low feed availability. All sows spent some time in each area, but this was clearly delineated by their social status.

Interestingly, based on measured cortisol levels, the dominant and submissive sows were more 'stressed' than subdominant sows, which adopted an opportunistic feeding strategy and despite the dominant, more aggressive sows gaining more weight than the others, all received adequate feed to maintain pregnancy and gain some weight.

Sows clearly work it out, but it's interesting that the subdominant sows appeared less stressed in employing their feeding strategy because the strategy was associated with them receiving more aggression.

The relationships between sow feeding strategy and 'stress' and aggression received are shown below.

The costs paid by less dominant sows in getting adequate feed should be considered when designing floor feeding systems. Results also suggest we need strategies to extend the feeling of satiety and/or appropriate enrichment strategies. Pork CRC has a number of projects on the latter.

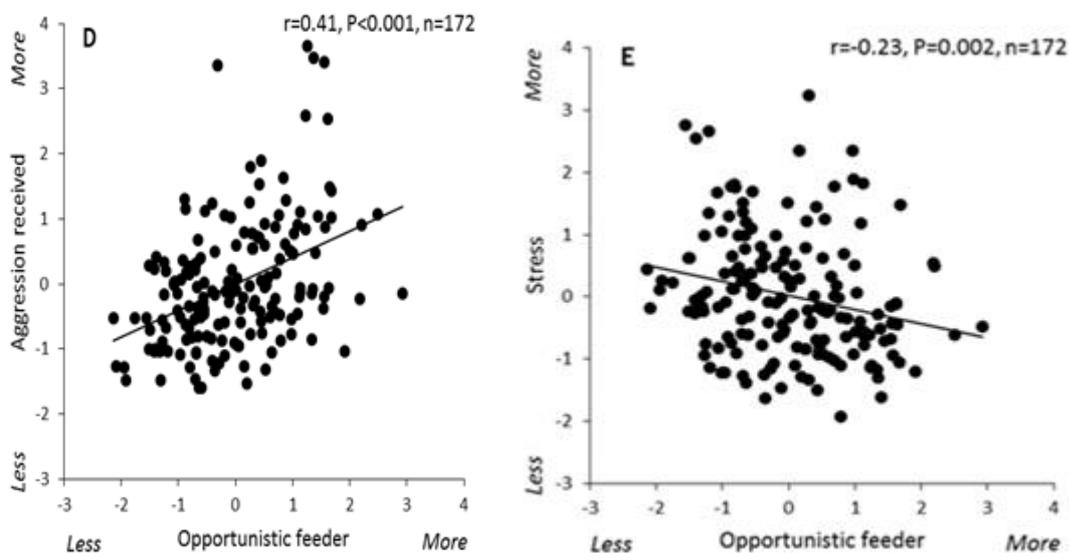


Figure 1: characteristics of opportunistic feeders in terms of aggression received and stress experienced (based on cortisol).

Aggressive groupings

In an earlier project (Project 1C-102) Megan and her colleagues investigated what would happen if you took sows all known to be aggressive and grouped them together. The behaviour, welfare and reproduction of these seemingly strange pen mates was compared with that of sows selected randomly.

Surprisingly, there were no differences. Sows in both treatments sorted out their hierarchy and exhibited very similar levels of aggression and reproduction. The researchers concluded that although individuals vary in their tendency to be aggressive to conspecifics, they show flexibility regarding this behavioural tendency, depending on the group composition. Socially experienced sows better predict the fighting ability of others and understand their own fighting capabilities. Thus, manipulating group composition has negligible effect on aggression and welfare in socially experienced sows housed in mixed-parity groups.

Experience counts

An unexpected finding of this experiment was that the coefficient of variation for sow parity was a more significant determinant of aggression post-mixing than treatment, variation in sow weight, average parity or average weight. Aggression post-mixing is largely associated with the establishment of new dominance relationships, whereas aggression after this is delivered in competition over a resource. Thus, ensuring there is variation in the age and experience of sows at mixing may actually play an important role in stabilising the social structure of the group.

The effects of the coefficient of variation in sow parity on aggression received is shown in Figure 2. You will note the effect was quite marked.

Fascinating research and the findings likely extend beyond the pig.

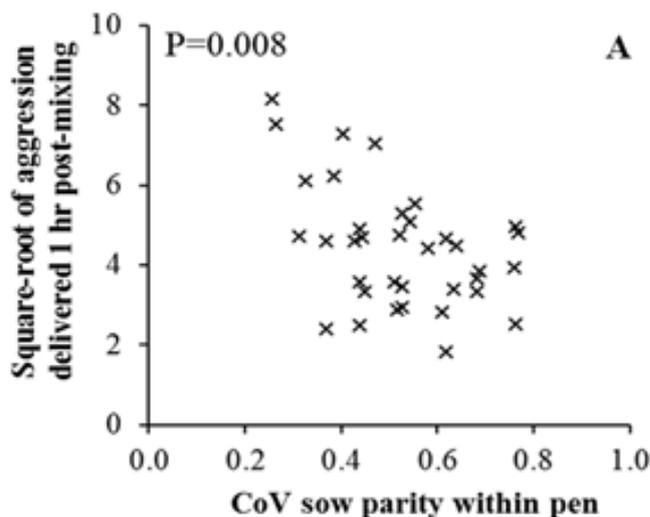


Figure 2: scatterplot showing the relationship between the coefficient of variation in sow parity at day 2 and aggression delivered for 1 hr post-mixing.

Creepy research

Pork CRC Project 1A-116 led by Dr Jean-Loup Rault investigated the effects of creep light intensity (Bright, 300 Lx, vs. Dark, 4 Lx) and mat temperature (30 C vs. 35 C mat surface) in SWAP pens on the time piglets spent in the creep area and in other areas of the pen. The research, which involved 113 sows and their piglets, was conducted at Laurie Brosnan's farm. I thank Laurie and his team for making their facilities available.

The results showed that piglets with access to the Bright creep spent on average 7.2 % more time ($P < 0.01$) in the creeps than piglets in pens with Dark creeps. For each degree increase in mat temperature, piglets spent on average 2.1 % more time ($P < 0.01$) in the creep.

While the treatment effects on creep use were associated with time spent in areas with the sow, there were no effects of treatment on weight gain to 72 hours or on piglet mortality.

Room temperature

Ambient temperature had a major effect on creep use and piglet survival ($P < 0.01$). The time spent in the creep area for the two replicates is shown in the graph below. The ambient temperature in replicates 1 and 2 was 23.8C and 27.3C respectively. Piglets spent 50% of their time in the first 72 hours after birth in the bright creep area in replicate 1 and considerably less time in replicate 2. Mortality in the first 72 hours after birth was 9.0% and 12.7% in the bright and dark creeps in replicate 1 and 7.4% and 4.3% respectively in replicate 2. All the results suggest ambient temperature is a major factor affecting piglet behaviour, performance and survival. They also show that the bright creep area was preferred when the environmental temperature was low (R1).

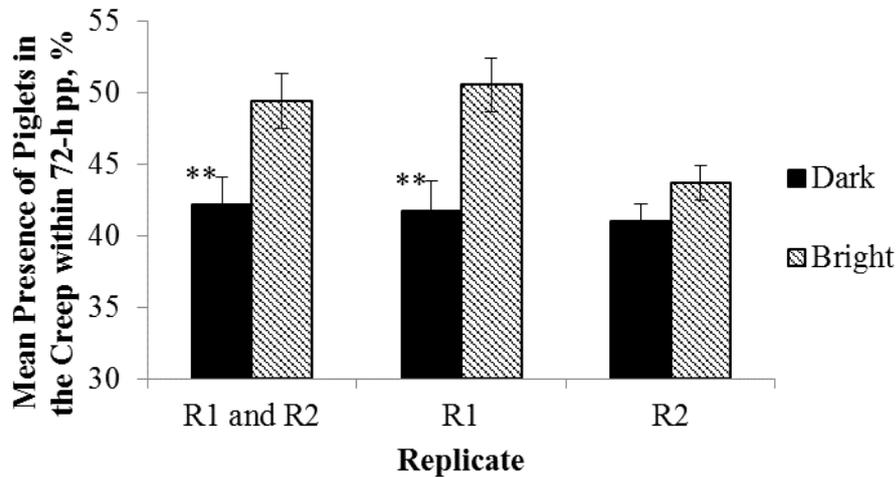


Figure: Mean time spent by the piglets inside Bright and Dark creep areas in first (R1) and second (R2) replicates.

A bit of a conundrum in that, as it appears you can drive piglets to a well-lit creep area by having the shed temperature low, but this increases the risk of piglet death. Not sure how the findings might relate to farrowing crates, but one other finding was that the set mat temperature and actual mat temperature often differed and there's really a need in any system to ensure creep areas are effectively heated.

I think you will agree we have excellent researchers and that the science is quite fascinating.

Au revoir

Sadly, Dr Jean-Loup Rault is leaving the Animal Welfare Science Centre for a position as Professorial Head of the Institute of Animal Husbandry and Animal Welfare at the University of Veterinary Medicine in Vienna. An exceptional scientist, he has contributed significantly to our R&D program and industry in general. He will be missed and we wish him all the best in what seems an exotic place and position.

There is much more to come in the next six months and I look forward to the outcomes of a recently commissioned project on the effects on subsequent reproduction of grouping sows in the last week of lactation.

Different treatments

You may remember a previous Pork CRC project (1C-103) led by Dr Kate Plush, working with Professor Paul Hughes, Dr William van Wettere and our postgraduate student Ms (Now Dr) Emma Greenwood, which compared the welfare and reproduction of sows with different treatments before mixing. They found that sows grouped with their litters in the last week of lactation and given daily boar contact (MS), exhibited next to no aggression when grouped after weaning and had a larger subsequent litter size. They were compared with sows separated daily from their litters in the last week and weaned into groups (SEP), sows managed normally in the last week of lactation and grouped immediately after weaning and those weaned into stalls and grouped after mating.

The overall treatment means for subsequent total litter size were 13.8, 12.2, 12.3 and 11.0 respectively.

For sows mated after weaning (rather than in lactation), for the MS and SEP treatments, total litter size was 15.0 and 14.0 respectively, with the MS average significantly higher than for sows in the two more conventional weaning and grouping strategies.

These are big differences, with important commercial implications, given how much our relatively low numbers born and weaned impact volume and cost of production. The findings are being followed up in a large study at Rivalea.

All the reports mentioned here are on Pork CRC's website and I encourage you to look at 1C-103 in particular. It has many scientific and commercial implications for the management of group housed sows, some simple enrichment strategies and potential means of improving reproduction. If you want me to send you a copy, email me at Roger.Campbell@porkcrc.com.au

Price pointers

Confusion remains over exactly what prices producers are receiving, with buyers and sellers often reporting markedly different values, but the bottom line is that the average price on the eastern seaboard has fallen some 80 cents and in some states by more than \$1.00, since January. WA, where prices have held up better than in the ES, has recently come back by about 30 cents. The most telling graph is that for pig and grain prices reported by APL. Recently, the pig price line fell below the grain price line, which unfortunately is now moving north. In the past, this has been a good indicator that things could be better and of future consolidation of our industry. The other interesting graph reported by APL is that for slaughter numbers. On a moving annual total, these have increased linearly since August 2014 and exceeded 5.1 million on a moving annual basis in April 2017. The same graph was published as graph of the month by Whole Hog in July 2017.

It seems to me that we have exceeded demand and while the imports of cooked ribs have had some effect, we have an oversupply situation.

COP out

This might not be the case if our COP was closer to \$2.00 than \$3.00/kg, but then numbers would have exceeded 5.1 million some time ago and prices probably would have never reached the very high levels experienced in the past 2-3 years and particularly in 2016.

We have been here before, but this time when we come out of it I hope it's with an even more efficient and competitive industry. We need to get COP closer to import parity and initially target \$2.20/kg carcass weight. While I acknowledge this is tough with feed costs at \$350+/tonne, until someone comes up with a viable alternative for grain this is where we should start.

With feed around \$350/tonne, COP is around \$2.60.

Assuming a HFC of 3.8, 21.5 pigs sold/sow/year and a 75 kg carcass.

Increase carcass weight by 3 kg – COP \$2.52

Increase pigs sold/sow/year by 1.5 – COP \$2.45

Reduce HFC to 3.5 – COP \$2.34

While we'd still need 14 cents, all improvements from the base line above are doable with current knowledge and technology and the targets are being achieved and exceeded by better producers. Average values for Pork CRC benchmarking participants in 2015-16 were 3.78, 22.5 and 77.4 kg. The best three herds for each KPI averaged 25.1 for pigs weaned/sow/year, 3.44 for HFC and a carcass weight of 85.7 kg.

Diet dilemmas

I haven't even discussed tweaking diet specifications or the number of diets used, to reduce the average cost of feed, or anything you can do to reduce feed wastage, but note that with feed at \$350/tonne, COP could be considerably less than \$2.60. In the US, feed costs \$AUD 277/tonne and COP is \$AUD 1.70/kg carcass weight.

With feed at \$400/tonne (as it was in 2015 and could be again), COP would be around \$2.74 and a somewhat different matter and we really need cost PLUS type contracts with those you supply and these will always be a component of success and sustainability. Nevertheless, reducing COP benefits the whole supply chain and helps buffer the industry from imports. If we get very good, maybe we can recapture some of the market(s) taken by imported pork.

Researcher challenge

The immediate challenge, from a Pork CRC perspective, is for our researchers to do their bit, as I've tried to explain what I think producers and their advisors have to consider. Firstly, our researchers must understand the situation Australian producers face and genuinely strive to change this with their research. Great science and industry outcomes are not mutually exclusive. Secondly, we need a better mix of shorter term (why do we not try this?) and longer-term research projects, with the latter needing to be potentially system changing.

I want to see one of our researchers, or one of our teams, increase the number of piglets weaned per Australian sow by two (to 12) and the number of piglets weaned per 100 sows mated from 900 to 1100. Plenty of ways to achieve the latter, but none likely to involve what we've done previously. If they can't do it, then let us get someone who can safely change the sow? The New Zealanders, Danes and US can do it.

A similar situation exists with feed efficiency. We probably don't have to get new genetics, although some producers might want to consider this, but we do need new ideas and new science on how to improve feed efficiency in grower-finisher pigs. Little has happened in the area globally in the past 10 years. Targeting a feed: gain of 2.0 from weaning to 100 kg is a good place to start. This would give a HFC of just under 3.0, assuming no mortality and minimal wastage. So, there's plenty of room to move to get to 3.3-3.5 commercially. Just need the ideas and science.

Similar challenges and opportunities exist with improving health and reducing medication costs. Ditto for improving how grain and feed is utilised with processing technologies, new science on enhancing digestion, and with some advances in nutrition in general.

Steering scientists

My feeling is that we have made real advances in the past five to six years in the science of animal welfare and improving sow welfare on farm, in developing technologies for reducing antibiotic use and in improving eating quality and carbon reduction, but we've seen few advances in production efficiency. This has to change and the opportunities are endless, but will not be realised without new ideas and new science. I think we have the scientists, so we just need to steer them in the right direction and ensure they have the support to lead us to a markedly more competitive and more proactive industry. This will be the driving force for APRIL.

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