



PigTALES

Future of RD&E facility base funding

WA has enjoyed funding for local RD&E facilities during the past ten years under the national base funding model which has focussed industry resources on fewer, better funded facilities to provide some level of certainty in operation.

Until its closure in April 2018, Medina's weaner and grower/finisher facilities were included in the base funding model, and during the past two years PIWA has received funding to help support research undertaken in weaner and grower/finisher facilities at Westpork, Craig Mostyn Group's meat laboratory, and Murdoch University's Isolation Animal House.

The current arrangements cease on 30th June this year and PIWA, on behalf of the WA industry, has put forward a proposal encompassing a suite of facilities for consideration by APL and APRIL. We will keep industry informed of its progress.



Dr Karen Moore, Sam Sterndale and Dr Megan Trezona at the 17th Australasian Pig Science Association Conference in November 2019.

PIWA amongst the action at APSA

PIWA was very well represented at the 17th Australasian Pig Science Association (APSA) conference with Karen, Megan, Samantha, Diana and Emalyn attending the four day meeting in Adelaide last November.

Eight papers summarising PIWA's recently completed projects were accepted, and Karen, Megan and Diana gave oral and poster presentations on this work.

The following papers are published in *Advances in Animal Biosciences* (Volume 10 - Issue S1 - November 2019) which is available for purchase from APSA's website: www.apsa.asn.au/Proceedings

Moore K.L., Clarke T. and Edwards A.C. 2019. Feeding the same diet to pigs in the grower-finisher period reduces feed costs compared to phase feeding with no effect on growth performance and carcass quality. *Advances in Animal Biosciences* 10:S1, s83

Moore K.L., Loudon E. and Dunshea F.R. 2019. Feeding *Lupinus albus L.* to immunocastrated male pigs to reduce feed intake and backfat. *Advances in Animal Biosciences* 10:S1, s33

Trezona M., Moore K.L. and Stensland I. 2019. Colour difference between free range and conventional pork from entire males is greatest during spring. *Advances in Animal Biosciences* 10:S1, s38

Trezona M., Stensland I., Loudon E., Cochran Z. and Dutton S. 2019. Preliminary study: A novel snout cooling system in farrowing huts reduced stillbirths in free range sows during summer. *Advances in Animal Biosciences* 10:S1, s98

Trezona M., Stensland I., Loudon E., Cochran Z. and Dutton S. 2019. Proof of concept: Does snout cooling in farrowing huts during summer encourage free range sows to remain with piglets for longer periods during early lactation? *Advances in Animal Biosciences* 10:S1, s99

Turpin D.L., Pluske J.M. and Pluske J.R. 2019. Antibiotic use and the expression of wild type patterns for *Enterococcus* species isolates: A comparison of three different pork production systems. *Advances in Animal Biosciences* 10:S1, s49

Turpin D.L. and Pluske J.R. 2019. Minimal increases in space allowance during the nursery phase in a commercial setting improves performance and health. *Advances in Animal Biosciences* 10:S1, s45

Turpin D.L. and Pluske J.R. 2019. Sorting newly weaned pigs by body weight in a commercial setting takes more time and does not improve performance. *Advances in Animal Biosciences* 10:S1, s89

In this issue...

- Current and completed projects
- Albus lupins as a strategy for efficient production of IC male pigs
- Staff update

We thank you for your continued interest and welcome your feedback. For those readers receiving a hard copy of Pig Tales, please let us know if you'd prefer to receive the newsletter via email. If you would like to be added to or removed from the mailing list, please contact Emalyn Loudon at contact@piwa.com.au.

.....
contact@piwa.com.au



Development of an on-farm immunoassay test kit

This project aimed to develop an oral fluid diagnostic kit using lateral flow technology (similar to a kit used for pregnancy testing) that would quickly show the immune status of a large herd from saliva samples. Decisions could then be made regarding the need for nutritional and/or veterinary intervention with the option for more testing.

During the transition of research from the then Department of Agriculture and Food WA (DAFWA), PIWA completed two research projects originally awarded to DAFWA from the Pork Co-operative Research Centre (Pork CRC).

On farm immunoassay test kit for inflammatory diseases to test the immune status of a herd (2A-112) was led by Dr Jae Cheol Kim and completed by Dr Diana Turpin.

A recent breakthrough in diagnosis of herd immunity is the use of oral fluid-based diagnostics for the assessment

of health and diagnosis of disease. Oral fluid is relatively easy to collect on a commercial farm by hanging cotton rope in a pen and allowing the pigs to chew on it for a period of time.

In order to develop such a diagnostic kit, biomarkers known to be reliable indicators of immune status in serum or plasma had to be selected and validated as reliable indicators of immune status in saliva. It also had to be determined whether a single point measure of biomarkers in a group saliva sample represented the average of individual samples in the same group.

Data was collected from seven commercial farms in WA with and without major health issues. C-reactive protein and haptoglobin were selected as good candidates for the reactive protein biomarker to be used in the immunoassay kit since levels in plasma were positively correlated to levels in

saliva. Data indicated that the one point oral fluid sample collected by hanging a cotton rope in a pen did represent the mean concentration determined by collection of oral fluid samples from individual pigs in the same pen for haptoglobin but not for C-reactive protein.

Haptoglobin could therefore potentially be a suitable marker for the development of an immunoassay kit, however, results also highlighted a number of limitations to consider before progressing to stage two (development of a prototype kit).

PIWA gratefully acknowledges the funding provided by the Pork CRC and DAFWA's prior contribution to the project.

A copy of the full report can be downloaded from www.piwa.com.au/our-research

Current projects

PIWA has funding for a number of new projects which are either underway or due to start in the coming months, including:

- Can black soldier fly larvae be used as a dietary protein substitute and reduce antimicrobial use in weaner pigs? (funded by APC Pork Producers Committee)



- Commercial validation of Weight-Detect™ and Enviro-Detect™ Machine (funded by APC Pork Producers Committee)
- Increasing percentage of live born piglets in free range litters during summer (funded by APC Pork Producers Committee)
- Optimising the dose of cysteamine supplementation in finisher pigs and determining the synergistic effects of cysteamine and betaine supplementation in finisher pigs, as part of a larger project Use of dietary additives and neuroleptics to improve efficiency and carcass composition of growing pigs (funded by Australian Pork Limited).

Outcomes will be available in future editions of Pig Tales and on our website.



Staff update

PIWA continues to benefit from the services of research consultant Dr Karen Moore and Dr Megan Trezona, R&D Manager for Linley Valley Pork/CM Farms, under an arrangement with Craig Mostyn.

Since Diana Turpin's transition to a new role within Murdoch University Sam Sterndale (pictured) is now the PIWA-sponsored Research Fellow. Sam is completing her PhD and undertaking industry projects on behalf of PIWA and Murdoch. Sam's research interests include nutrition and reducing stress response in weaners exposed to pathogenic or physiological challenges.

Alternatives to vitamin E not the answer for weaners

This project aimed to explore the effectiveness of lower cost alternative feed additives that can partially replace vitamin E in diets for weaner pigs.

The second project awarded to DAFWA from the Pork CRC and completed by PIWA was *Alternatives to vitamin E for the cost-effective management of cellular antioxidant capacity in weaner pigs experimentally infected with enterotoxigenic strain of E. coli* (2C-119).

Vitamin E is often added to commercial diets for weaner pigs at levels of 50–100 IU/kg feed for its antioxidant effects. Due to a number of abrupt dietary, environmental and social changes at weaning, marked anti-inflammatory and anti-stress responses are often observed resulting in increased oxidation stress and cell damage. The vitamin E reserve in the body of piglets is known to rapidly decrease close to the deficiency level (1 mg/L in plasma) due to these stressors. Moreover, the reduction in the vitamin E reserve can further decrease when piglets are exposed to enteric pathogens such as *Escherichia coli* (*E. coli*). Therefore, increasing antioxidant levels in the diet for weaner pigs is generally accepted as a complementary strategy to reduce morbidity and mortality in the immediate post-weaning period.

Increasing vitamin E levels in the diet to ≥ 200 IU/kg of feed has reported favourable outcomes with respect to feed conversion most likely through an improvement in the anti-inflammatory response. However, recent publications indicate that a comparable level of cellular antioxidant and anti-inflammatory capacities can be achieved through the use of other catalysts such as quercetin (a plant flavonoid) or a combination of copper and vitamin C.

The aim of this project was to explore the effectiveness of these alternative

feed additives. The experiment was conducted at Medina Research Station where a standard commercial inclusion level of vitamin E (70 IU/kg) in the diet was compared with high inclusion levels (200 IU/kg) and partial inclusion levels (50 IU/kg). The partial inclusion level diets included either quercetin (30 mg/kg) or a combination of copper sulphate (175 ppm) and vitamin C (500 mg/kg). An in-feed antibiotic was also included as another treatment given the pork industry has traditionally used in-feed antibiotics to ameliorate pathogen infection and mitigate the post-weaning malaise. Five out of the six treatment groups were challenged with a strain of enterotoxigenic *E. coli* (ETEC) one week after weaning.

There was no difference in the incidence of post-weaning diarrhoea throughout the experiment, however pigs not challenged with ETEC and pigs challenged with ETEC and given an in-feed antibiotic grew the least amount of beta-haemolytic *E. coli* on sheep blood agar plates. As expected, plasma vitamin E was highest in pigs supplemented with the highest level of vitamin E (200 IU/kg) and all indicators of inflammation (haptoglobin, C-reactive protein), oxidative stress (malondialdehyde, glutathione, total antioxidant capacity) and metabolic stress (urea) increased immediately after the ETEC challenge with the exception of PigMAP, where there was no change over time across treatments.

Despite the ETEC challenge inducing an inflammatory and oxidative stress response, no significant differences between treatments for body weight, average daily gain, average daily feed intake and feed conversion ratio were found. The pigs given an in-feed antibiotic did however have the lowest plasma concentration of haptoglobin and C-reactive protein compared with other treatment groups with the exception of the pigs that were not challenged with ETEC.



Overall higher levels of vitamin E supplementation (200 IU/kg) and partial replacement of vitamin E with quercetin or a combination of copper sulphate and vitamin C had no effect on the immune response or performance in pigs challenged with enterotoxigenic *E. coli* one week after weaning.

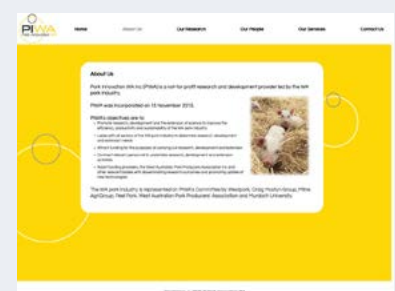
Nevertheless, these results do highlight the importance of the anti-inflammatory effect of antibiotics and understanding this effect further may assist pork industries worldwide as they explore alternatives to antibiotics.

The project was led by Dr Jae Cheol Kim and completed by Dr Diana Turpin. PIWA gratefully acknowledges the funding provided by the Pork CRC and DAFWA's prior contribution to the project.

A copy of the full report can be downloaded from www.piwa.com.au/our-research

Website launch

PIWA has recently launched its website to keep stakeholders up to date with current projects and completed research reports. Visit www.piwa.com.au.



Albus lupins as a strategy for efficient production of IC male pigs

The aim of this project was to determine the concentration of albus lupins to be included in the diet of IC males which would maximise the decrease in feed intake and backfat whilst optimising the effect on growth rate.

Immunisation against gonadotropin releasing factor (GnRF) is an effective strategy to eliminate boar taint. However, immunocastrated (IC) males have an increased feed intake, growth rate and backfat compared to entire males. The inclusion of albus lupins in diets has shown potential in overcoming the issues of increased feed intake and back fat associated with IC males but the optimal inclusion concentration of albus lupins is unclear. The experiment was conducted at Medina Research Station where 216 IC male pigs were fed varying concentrations of albus lupins (0 to 200 g/kg) from 2 weeks after the second immunisation against GnRF for 14 days pre-slaughter. Growth performance, carcass characteristics and economic considerations were determined. Day 0 is the day the second Improvac® dose was given.

Increasing the concentration of albus lupins decreased average daily feed intake and decreased daily gain for d 15-28 and for the overall period from d 0-28 (Table 1).

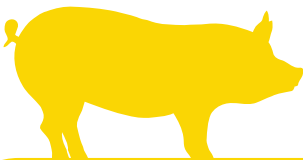


Table 1: Growth performance and carcass characteristics for immunocastrated male pigs fed different concentrations of albus lupins for two weeks prior to slaughter (from 78.9 to 112.4 kg LW).

	Albus lupins (g/kg)						SED ¹	P value	Predicted conc. (g/kg)
	0	40	80	120	160	200			
Daily gain (kg/day)	1.33 ^a	1.22 ^{ab}	1.16 ^{bc}	1.09 ^{bc}	1.19 ^{ab}	1.03 ^c	0.072	0.004	120
Feed intake (kg/day)	4.04 ^a	4.05 ^a	3.74 ^{ab}	3.62 ^b	3.59 ^b	3.45 ^b	0.178	0.012	142
Carcass weight (kg)	74.8 ^a	74.9 ^a	74.8 ^a	72.6 ^{bc}	73.8 ^{ab}	71.5 ^c	1.043	0.011	62.7
Backfat ² (mm)	12.2 ^a	11.6 ^{ab}	11.8 ^{ab}	11.0 ^{bc}	11.7 ^{ab}	10.2 ^c	0.563	0.021	138

^{a,b,c}Means within a row with different superscripts differ significantly ($P < 0.05$); ¹SED, standard error of difference of the means; ²Backfat measured at P2 site 65 mm from the dorsal midline at the point of the last rib.

Carcass weight and backfat decreased as the concentration of albus lupins in the diet increased.

At March 2018 costs there was no difference in the feed cost per pig from d 15-28. According to the pricing grid used in this experiment (April 2018) the price received per kg increased and there was a trend for carcass value to increase (3.3% to 6.5%) as the concentration of albus lupins in the diet increased.

Albus lupins can be included in the diets of IC male pigs for 14 d pre-slaughter (two weeks after the second immunisation against GnRF) to decrease feed intake and backfat. However as the concentration of albus lupins increases growth rate decreases. The concentration of albus lupins will ultimately depend on which parameter is desired to be optimised by the producer.

During 2013-2018 Australia produced on average 750,000 tonnes of lupins per year of which 20% were albus. Albus lupins are predominately grown in NSW and WA, however the challenge is sourcing feed grade product at commensurate prices.

This project was led by Dr Karen Moore. PIWA gratefully acknowledges the funding provided by the APC Pork Producers Committee.

A copy of the full report can be downloaded from www.piwa.com.au/our-research



The views expressed and the conclusions reached in this newsletter are those of the authors. Pork Innovation WA Inc and its employees and contractors do not make any representations or warranties about the accuracy, reliability, currency, completeness or suitability for any particular purpose of any information in, or referred to in, this newsletter.

All of the material published is for informational purposes only and does not constitute professional advice of any kind and should not be relied upon as such. Before using the information, you should carefully evaluate its accuracy, currency, completeness and relevance for your purposes, and obtain advice from appropriate professionals who have considered your individual circumstances and objectives. Pork Innovation WA Inc accepts no liability whatsoever, by reason of negligence or otherwise, arising from the use or release of information in, or referred to in, this newsletter, or any error, inaccuracy or omission in the information.

PIWA gratefully acknowledges the Department of Primary Industries and Regional Development's support and contributions to completed projects.

