Sows – recovering lost opportunities

by D. D'Souza, Alltech Biotechnology, Dandenong South, 3175, VIC, Australia, W. Close, Close Consultancy, Wokingham RG41 2RS, UK, and L. Tucker, Cundy Technical Services, New Zealand.

The major objective of pig production worldwide is to maximise the amount of pork produced per sow per lifetime at the lowest cost possible. Factors that contribute to achieving this objective encompass all stages of pig production including the reproductive performance of breeding animals (sows and boars), and efficient growth of the weaner and grower/finisher pig. In this article, the authors will focus on the importance of sow productivity and recovering lost opportunities for improving piglet production.

The Premier Pig Program has been developed to provide independent technical support for all sectors of the pig industry worldwide. The programme also gives target levels of growth efficiency, allowing producers to benchmark their farm's performance against industry standards, as well as discussing what intervention strategies and actions can be taken on farm if performance falls below expectation. The article highlights sow productivity data from key Asia Pacific countries. Sow productivity issues including litter size and piglet quality, piglet mortality, non-productive or empty sow days, and piglets per sow per year and their impact on pig production and profitability are outlined in the article. Finally, a range of nutritional strategies to assist pig producers to improve sow productivity and regain lost opportunities to maximise profitability are discussed.

The benchmarking data (represented as a range) presented in this article was compiled at the Premier Pig Program workshops, where producers from around the Asia-Pacific were able to benchmark their levels of sow productivity against commercial target and intervention limits as indicated.

In this way, the major areas where performance was below acceptable levels were identified and specific corrective actions recommended.

The major areas of sow productivity that were below target or intervention levels of performance were similar across countries and were culling rate, farrowing rate, litters per sow per year and per lifetime, empty or non-productive days, piglets born, born alive and weaned and piglet birth and weaning weight.

The trait most affected was the number of piglets weaned per sow per year and is affected by the number of piglets reared per litter and the number of litters produced per year. The latter is dependent on lactation length and the period between weaning and mating.

Usually, a seven day period is allowed for the sow to return to oestrus and be mated, anything longer than this will unduly increase parity length and hence reduce litters per sow per year. These extra days are termed empty or non-productive days and are expensive as demonstrated in Table 2.

These calculations demonstrate the considerable economic loss associated with just one aspect of reduced sow productivity and highlight the usefulness of the Premier Pig Program in establishing such relationships and in suggesting practical solutions to improve performance on farm.

The nutrition of gilts and sows plays a major role in their reproductive success and longevity within the herd. The body weight

Continued on page 12

Table 1. Key factors affecting sow productivity, suggested sow performance targets and intervention limits (Premier Pig Program; Close et al., 2005).

Country	Aus	China	Japan	Thailand	Vietnam	Target	Intervention
Culling rate (%)	30-60	10-50	30-50	15-40	10-40	35	>42
Average parity	3-3.5	4-6	3-5	3-5	3-4	4	<3 >6
Sow mortality (%)	2-14	1-10	2-5	2-5	1-15	<5	>5
Farrowing rate (%)	75-90	50-90	75-95	70-95	60-90	90	<83
Litters/sow/year	2.0-2.5	1.9-2.4	2.2-2.4	2.1-2.5	1.9-2.3	2.4	<2.2
Wean-mating interval (days)	5-10	5-10	4-10	5-15	3-15	5	>7
Sows mated <7 days (%)	70-95	75-90	90	75-95	-	90	<85
Empty days/sow/year	15-48	12-60	14-38	5-42	16-63	15	>20
Piglets born/litter (total)	11-12.5	10-13	10.5-13	9.5-13	9-12	12.0	<11.0
Piglets born alive	9.7-11.5	8-12	10-12	8-11	8-11	11.3	<10.0
Mean piglet birth wt. (kg)	1.0-1.5	1.1-1.6	1.2-1.6	1.1-1.5	1.0-1.5	1.4	<1.1
Pre-wean mortality (%)	7-20	5-20	3-10	4-15	5-10	10.0	>13.0
Piglets weaned/litter	8-10.5	8-12	9-11	7-10	8-10	10.2	<9.5
Piglets weaned/sow/year	16-26	17-23	20-25	14-25	16-22	24.5	<21
Age at weaning (days)	14-32	21-42	19-25	18-28	21-28	25	25
Piglet weaning wt. (kg)	4-10	5.5-8	5.5-7	5-8	5-7	7	<6
Feed/sow/year (t)	1.1-1.6	0.8-1.2	1.0-1.2	0.9-1.1	0.8-1.1	1.10	<1.00

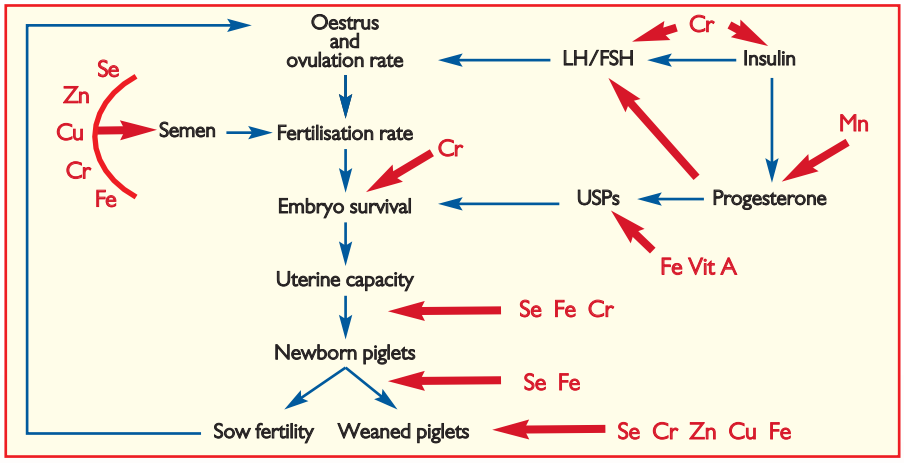

Fig. 1. Role of minerals in sows (Close, 2002). SE = selenium, Zn = zinc, Cu = copper, Cr = chromium, Fe = iron and Mn = manganese.

	Empty days*	Cost (local currency)	Cost USD
Australia	15-48	A$ 3.9	2.8
China	12-60	RMB 13	1.6
Japan	14-38	¥ 500	4.2
Thailand	5-42	Bhat 35	0.9
Vietnam	16-63	VND 20,000	1.3

**Assuming a farrowing rate of 85%*

Table 2. Calculated empty days per sow per year and their cost.

Continued from page 11

and condition score of the young gilt dictates when she reaches puberty, the ability to ovulate regularly and develop viable eggs, and the maintenance of subsequent pregnancies with good litter survival.

Maximising the production of viable piglets per sow per year, whilst maintaining the sow in the herd over many parities is important to the financial success of integrated pork production.

Ensuring gilts attain puberty and regular strong ovulation improves the chances of conception at first mating and a successful pregnancy. Correct delivery of key nutrients in suitable amounts can improve the quality of milk and piglets as well as reducing the number of empty days between weaning and mating.

To support both the animal's own nutritional requirements as well as providing for her gestating piglets, gilts need to carry sufficient tissue nutrient reserves, and should weigh approximately 135kg at first mating.

Delivery of certain nutrients is crucial to successful breeding as indicated in Fig. 1. Minerals and trace elements must be made available to ensure performance and longevity of sows.

	Control	Bioplex + Sel-Plex
Total born	13.5	13.9
Born alive	12.4	12.8
Weaned	11.1	11.6
Pre-weaning mortality (%)	10.5	9.4

Table 3. Bioplex + Sel-Plex minerals and sow productivity (parities 3-6).

High performing animals are at risk from increased exposure to oxidising free radicals, produced from metabolism, respiration and the immune system. The reproductive system is especially sensitive to free radicals, as exposure causes DNA and embryo damage.

In comparing the total body mineral content of sows that had completed three pari-

Table 4. Effect of chromium yeast (Bio-Chrome) on sow productivity (Prachin et al., 2002).

	Control	Bio-Chrome (200 ppb)
Parity 1		
No. of animals originally selected	68	86
No. of gilts mated	54	69
Piglets		
Total born	9.5	9.9
Born alive	8.7	9.3
Stillborn/mummies	0.8	0.6
Wean-oestrus interval (days)	8.4	6.9
Parity 2		
No. of sows mated	44	64
Piglets		
Total born	9.6	10.0
Born alive	9.0	9.2
Stillborn/mummies	0.6	0.8
Wean-oestrus interval	8.4	7.0
No. of sows at end	37	59
Sow losses: selection-end (%)	46	31

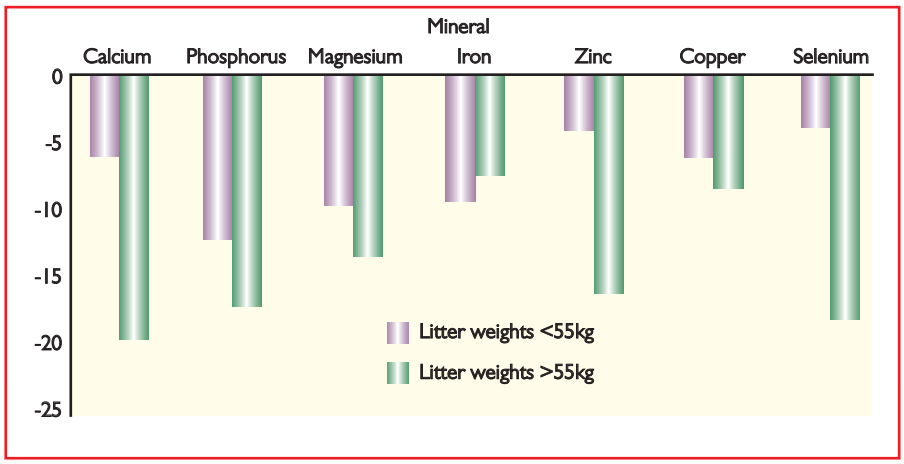

Fig. 2. Change in the body mineral content of sows after three parities (0 represents the mineral content of the non-pregnant animal) (Mahan and Newton, 1995).

ties with that of sows of similar age but which had remained non-pregnant, Mahan and Newton (1995) demonstrated that sows that had completed three parities had lower mineral content and that higher performance (total litter weight at weaning) resulted in even lower total body mineral content.

Organic versions (Bioplexes) of selenium and other minerals improve piglet litters when fed in sow rations by increasing the number born alive and successfully weaned, especially in mid to late parity sows (Table 3).

Correct mineral nutrition exerts a large effect on reproductive success as the sows age. Studies have shown that sows receiving combinations of organic minerals in feed retain their place in herds for longer than those fed conventional inorganic mineral diets as indicated in Fig. 3.

Chromium is particularly important in reproductive success. It is linked to insulin activity, which stimulates hormones important in ovulation, embryo survival and gestation. Chromium supplementation is especially important in the first four weeks of gestation, and sows fed 200ppb from organic sources produce, on average, 1.3 more viable embryos with a 5% higher survival rate.

Adequate chromium supply can increase sow productivity and longevity. Supplemented sows have a shorter weaning oestrus interval (1.4 days), reducing the number of unproductive 'empty days' and allowing more successful piglet production per year of production.

Mycotoxins such as zearalenone cause inflammation of the vulva, leading to infertility, anoestrus, prolapses, false pregnancy, embryo mortality and small litters.

It can also be passed to piglets via the milk, inhibiting their performance and reducing viability, immunity and weaning weight.

Where sows have been exposed to known amounts of zearalenone at oestrus and during pregnancy, trials have shown reduced oestrus and conception rates, higher levels of abnormal piglets and reduced foetal and placental development.

	Control (n=517)	Bio-Mos (n=509)
Parity	3.23	3.29
Return to oestrus (d)	7.27	5.20
Pre-weaning mortality (%)	11.27	9.09
Average birth weight (kg)	1.66	1.69
Average weaning weight	5.47	5.80
Pig ADG (g/day)	177	195
IgA (mg/dL)	1,097	1,178
IgG (mg/dL)	4,842	5,853
IgM (mg/dL)	241	273

Table 5. Enhancing sow's immune system.

However, the use of an effective mycotoxin binder such as Mycosorb can alleviate these negative effects and results in improved sow performance. A commercial study on a 600 sow farm found that the use of Mycosorb instead of a clay resulted in;

- 5.2% increase in piglets born alive.
- 32% reduction in stillborns.
- 15% increase in wean weight.
- 6% reduction in pre-wean mortality.
- 34% increase in sows bred within seven days post-weaning.
- 18% decrease in days to first service post-weaning.
- 24% reduction in empty days.
- Farrowings per year increased from 2.2 to 2.4.
- 24% increase in piglet daily weight gain.

An economic analysis found that feeding Mycosorb to sows for a year resulted in a return of US$14,293 per year.

It has been recently shown that in lactating sows, that there is chronic activation of the immune system and this leads to less milk production and output. Hence it is crucial to enhance the sow's immune system to ensure both improved sow and piglet performance.

Recently, Funderburke (2002) reported that inclusion of Bio-Mos in the gestation and lactation diets can have a beneficial impact on the immune system of sows and result in improved sow and piglet performance (Table 5), including quicker return to oestrus, lower pre-wean mortality, higher birth weight, wean weight and higher immunity (immunoglobulin levels).

Conclusion

The benchmarking data from the Premier Pig Program indicate that sow productivity can be improved within the Asia Pacific region and this, in turn, will have a major impact on pig production profitability. It also highlights key nutritional strategies such asBioplex minerals, Bio-Mos and Mycosorb that can improve sow and piglet performance and recover lost opportunities. ■

Fig. 3. Effect of Bioplex Sow Pak on proportion of sows at the different parities (Fehse and Close, 2000).