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The Influence of Supplemental Organic Minerals on Sow Productivity

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There is concern that the mineral requirements of the modern hyperprolific sow may be higher than current recommendations. Indeed, Mahan and Newton (1995) have shown the considerable de-mineralisation of the skeletal structures that occurred in the high-performing sow, even when fed to NRC (1988) recommendations. This may influence overall lifetime performance and raises questions about the mineral requirements of the modern sow, as well as the sources of the minerals provided and their availability to the animal. This has prompted interest in the use of organic minerals and the present trial examined the effects on sow and piglet performance of the addition of a special supplement of organic minerals additional to the normal inorganic minerals in the diet of gestating and lactating sows.

Methodology:

The trial was carried out on a 150-sow research farm in Switzerland (Rüti AG) and compared the productivity of a control group of sows fed the normal mineral allowances from inorganic sources, with animals given an additional supplement of organic minerals (Sow Pak). The composition of the control and supplemented diet is presented in Table 1.

Table 1. Trace mineral composition of the diets

	Control	*Sow Pak**
Zinc (mg/kg)	80	106.2
Manganese (mg/kg)	40	55
Iron (mg/kg)	80	102.5
Copper (mg/kg	15	22.5
Chromium (ppb)	-	200
Selenium	0.25	0.425

* The Sow Pak contained 26.2 mg Zn, 15 mg Mn, 22.5 mg Fe, 7.5 mg Cu, 200 ppb Cr, 0.175 mg Se and 120 g De-Odorase per kg and was provided by Alltech Inc.

The trial lasted 2 years and the procedure was to allocate sows to the treatments at farrowing until half the herd was fed the control and half the Sow Pak diet. These diets were fed until the end of the trial and spanned sows from parities 2 to 12. In all, there were 742 litters of piglets: 386 from the control and 356 from the Sow Pak sows.

Results:

For ease of comparison, the results have been categorised into early (parities 1 and 2), middle (parities 3-6) and late parities (parities 6+) (Table 2).

There was no significant ($p>0.05$) effect of treatment on reproductive performance, but from parity 3 onwards, those fed the Sow Pak had higher litter sizes and weaned 0.5 more piglets per litter in parities 3-6, the peak parities. Also, the pre-weaning mortality was reduced between parities 3 and 7. The Sow Pak was not provided until after farrowing in parity 1 and therefore the sows in parity 1-2 would not all have received the additional minerals.

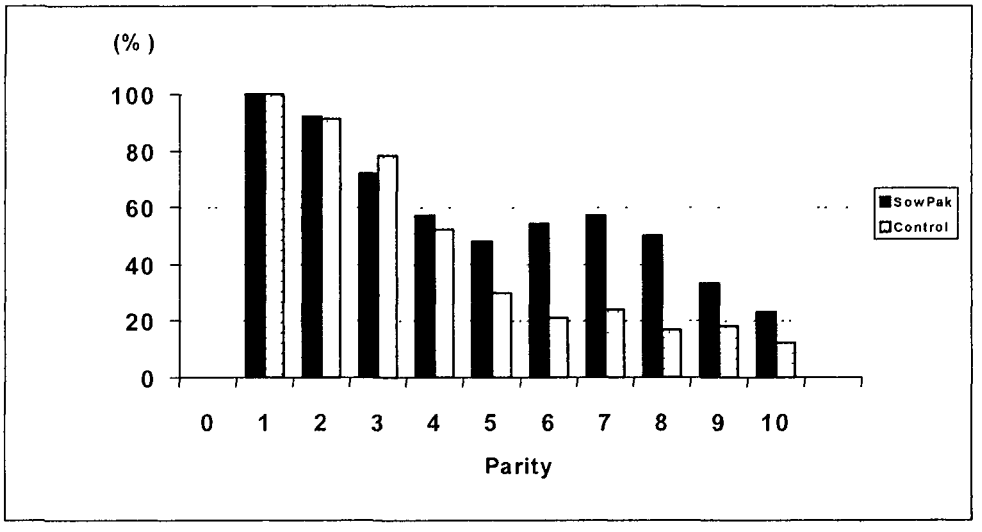
There was no difference between treatments in performance of the piglets and litter growth rates of 2.4 kg per day and litter weaning weights of over 80 kg were achieved in parities 3-6 at 26 days of age. There was also no significant effect ($p>0.05$) on the change in body weight, backfat thickness or condition score of the sows, or on overall feed consumption. Similarly, there was no difference in the period between weaning – oestrus and the sows produced 2.40-2.45 litters per year.

Analysis of the data suggested that when the proportion of sows at the various parities were compared, there was little difference between the treated groups over the first four parities (Figure 1), with the proportion decreasing from 100% in parity 1 to 52-57% in parity 4. Thereafter, the proportion of the control sows on trial decreased from 52% in parity 4 to ~20% in parity 6-8. The proportion of the sows fed the Sow Pak diet remained at 50-55%. This suggests that the sows fed the Sow Pak diet were better able to maintain good sow productivity in the most productive parities and more were retained than the control sows.

Table 2. Effect of treatment on reproductive performance (mean ±sd)

	Total born		*Born alive*		*Weaned*	
	Control	*Sow Pak*	*Control*	*Sow Pak*	*Control*	*Sow Pak*
Parities 1-2	11.4 ±2.7	10.9 ±3.2	10.5 ±2.6	10.1 ±3.1	9.6 ±2.7	9.0 ±2.3
Parities 3-6	13.5 ±2.6	13.9 ±3.5	12.4 ±2.7	12.8 ±3.0	11.1 ±2.8	11.6 ±2.8
Parities 6+	13.0 ±3.2	13.8 ±3.0	11.9 ±2.9	12.3 ±3.0	10.7 ±2.2	11.0 ±3.0

Figure 1. Proportion of sows on trial



Conclusions:

It is worth noting the very high performance levels achieved by the sows on both treatments. However, from parity 3 onwards, those sows fed a proportion of their mineral allowance in organic form showed better overall productivity than those fed only the inorganic sources. This meant 0.3 extra piglets weaned per litter, or 0.7 more piglets per sow per year. Despite the high performance there was no difference in growth rate or weaning weight of the piglets or in the body condition of the sow. However, it appeared that the sows fed the Sow Pak diet were better able to maintain productivity and were retained in the trial. This is of considerable economic importance. It may well be that the mineral requirement of the modern animal is higher than previously accepted and that inadequate provision limits performance. In addition, it is possible that because of their higher bio-availability, organic minerals better meet the needs of the animal, affording them a 'metabolic benefit' and hence, better performance.

References:

Mahan, D.C. and Newton, C.A. (1995) *Journal of Animal Science* **73**, 151-158.

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