Sponsors

University of Minnesota
College of Veterinary Medicine

College of Food, Agricultural and Natural Resource Sciences

Extension Service

Swine Center

Thank you to **IDEXX Laboratories** for their financial support to reproduce conference proceedings

Production Assistants
Steven Claas
Michael Klatt

Layout and CD-ROM
David Brown

Logo Design
Ruth Cronje, and Jan Swanson;
based on the original design by Dr. Robert Dunlop

Positive effect on litter size when first-party sows were fed diets containing a combination of organic and inorganic trace minerals

Gustavo J. M. M. Lima [1], Fábio Catunda[2], William Close[3], Luiz C. Ajala[1], Fernando Rutz [4]
[1] Embrapa – Swine and Poultry Res. Center, Brazil; [2] Alltech Brazil; [3] Close Consulting; [4] UFPel

Introduction

Adequate nutrition is necessary to ensure the genetic potential to improve litter size. Efficacy of organic minerals in swine nutrition has not been adequately evaluated, particularly during reproduction. Essential microminerals have been mostly added to diets in inorganic salt forms. The increase in number of live pigs at birth was reported (1) when part of inorganic minerals was replaced by organic mineral sources in low productive sow diet herds. The objective of this study was to determine the effects of the combination of inorganic and organic sources on performance of first-parity sows.

Materials and Methods

Eighty gilts (Landrace X Large White) were randomly divided into two treatments: T1– microminerals as inorganic mineral sources; T2 – microminerals, included as a combination of inorganic and organic mineral sources (Table 1). Diets were based on corn and soybean meal and they were fed from mating to weaning. Gestating and lactating diets were formulated to contain 3000 and 3300 kcal EM/kg and 0.54 and 1.00% digestible lysine, respectively. Gestating diets were fed 2,0 kg/day from mating to day 100 of gestation followed by 3,0 kg/day until parturition whereas lactating diets were fed *ad libitum*. Litters had no creep feeding. Data were submitted to analysis of variance and covariance (2) with treatment as main factor.

Table 1. Source and level of each supplemented element according to treatment.

	T1	T2		
Element	Inorganic	Inorganic	+	Organic
Zn, mg/kg	120	80	+	40
Mn, mg/kg	40	20	+	20
Fe, mg/kg	120	30	+	90
Cu, mg/kg	15	5	+	10
Se, mg/kg	0,3	-		0,3
Cr, mcg/kg	-	-		200

Results and Discussion

There were no significant treatment effect (P>0.05) on sow body weight, body condition score and backfat thickness (P2) at the 100th day of gestation, farrowing and weaning. Sow feed consumption and wean to estrus interval were not affected (P>0.05). However, treatments significant affected number of live piglets at birth (LB), stillbirths (S), and litter size at weaning (LW – Table 2).

Table 2. Effects of treatments on litter size.

	Treatment		
Variable	T1	T2	P value
LB	10.43± 0.33	11.22± 0.33	0.09
S	0.64 ± 0.10	0.27 ± 0.09	0.007
LW	9.45 ± 0.33	10.29± 0.33	0.07

These results confirm previous positive effects of organic minerals on reproduction of sows (1,3) and demonstrate that the positive effects can already be shown at the first parity. The increase in litter size and the reduction in stillbirths with the partially replacement of inorganic minerals by organic trace minerals is not completely understood. It may be hypothesized that an increase of bioavailability of the organic mineral sources brings about an improvement of reproductive performance of sows. In addition, it has been suggested (4) that a greater number of pigs born may be achieved when inorganic trace mineral levels were provided at levels below NRC-1998, suggesting detrimental effects when inorganic minerals are fed in excess.

References

1. Mirando, M.A., D.N. Peters, C.E. Hostetler, W.C. Becker, S.S. Whiteaker and R.E. Rompala. 1993. Dietary supplementation of proteinated minerals influences reproductive performance of sows. J. Anim. Sci. 71(Suppl. 1):180. **2.** SAS Institute Inc. System for Microsoft Windows. Release 8.2., Cary, NC, 1999-2001, CD Rom. **3.** Mahan, D.C. and J.C. Peters. 2004. Long-term effects of dietary organic and inorganic selenium sources and levels on reproducing sows and their progeny. J. Anim. Sci. 82:1343-1358. **4.** Flowers, W.L., J.W. Spears and G.M. Hill. 2001. Effect of reduced dietary Cu, Zn, Fe, and Mn on reproductive performance of sows. J. Anim. Sci. 79(Suppl. 2):6.