

Benefits of a chelated trace mineral blend (MINTREX®) on immune function in gilts

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ABSTRACT

Trace minerals are required for proper immune development and function. Deficiencies in trace minerals can cause decreased antibody responses to vaccination, which could be very costly in sow production. The objective of this trial was to test benefit of a chelated trace mineral blend on immune function and reproduction performance in gilts. Replacement gilts (50 per treatment) were fed diets supplemented with 165 ppm zinc, 16 ppm Cu and 38 ppm manganese, either as inorganic trace minerals (ITMs) or an equal mixture of ITMs and HMTBa-chelated minerals (MINTREX®, Novus International Inc). The pigs were vaccinated with a commercial vaccine for *Mycoplasma hyopneumoniae* (Myco Silencer Once-Intervet) on weeks 0 and 2 postweaning, and bled for antibody titers on weeks 0, 2, 4, 8 and 12. Titers were measured by a commercially-available ELISA. Log titers below 2.8 are considered to be negative titers according to the kit instructions. While both groups of pigs achieved a similar titer by 12 weeks, the gilts supplemented with the chelates reached a positive titer 8 weeks prior to the gilts fed the control diet. A large scale follow-up study suggested that gilt removal rate was reduced 10% with MINTREX supplementation with 8.0% vs. 8.8% for MINTREX and ITMs, respectively (P=0.04). Mortality rate was 1.52% and 2.12% for MINTREX and ITMs, respectively (P=0.001). In addition, gilts fed MINTREX had better walking/leg score than ITMs group evaluated around 100 kg body weight. These data suggest that for those eight weeks, the replacement gilts fed ITMs were not as protected against *M. hyopneumoniae* as the gilts fed the HMTBa-chelated minerals were. Consequently, gilts fed MINTREX were in better health status and were better prepared for reproduction.

INTRODUCTION

Trace minerals are required for proper immune development and function. For example, deficiencies in zinc can cause decreased antibody responses to vaccination. Copper plays critical role in innate immune function. Gilts are the most costly and challenged population in sow farm. Good gilts produce better progeny and are more productive in their life time. Our previous studies indicated that supplementation organic trace minerals (MINTREX) source enhanced cellular or antibody responses to vaccination in poultry (Richards et al., 2010). The objective of this trial is to study the effect of feeding a chelated trace mineral blend (MINTREXCu,Zn,andMn)ontheimmuneresponsetovaccinationin replacement gilts, and its benefits on gilt quality (mortality, removal rate and skeletal health).

MATERIALS AND METHODS

Two farms with 6,400 sows each were engaged in this study. One farm was fed the inorganic mineral control (ZnO, CuSO₄, and MnO) and the other using MINTREX (Cu, Mn, and Zn) to replace 50% of the inorganic minerals. Total mineral level in both farms was equal with target supplementation levels of Zn, 165 ppm, Cu, 16 ppm, and Mn, 38 ppm in the final diet.

Treatments were initiated upon arrival (weaning) and continued through growing and entry into the breeding herd. The study lasted from 2007 to 2010 and total of 20,000 gilts entered the farms. Gilt performance (removal rate and mortality) was recorded by Agrasoft. Consequent sow reproduction performance please refers to Zhao et al. (2011).

For antibody titer, a total of 50 pigs from each treatment were vaccinated with a commercial vaccine for *Mycoplasma hyopneumoniae* (Myco Silencer Once-Intervet) on weeks 0 and 2 postweaning, and bled for antibody titers on weeks 0, 2, 4, 8 and 12. Titers were measured by a commercially-available ELISA kit. Log titers below 2.8 are considered to be negative titers according to the kit instructions.

Leg score was evaluated on 70 gilts around 100 kg body weight. A scale of 0-3 with 0 represents normal health and 3 represents sever lameness was used to evaluate four part of each leg (Toes, Pastern, Knee/Hock, and Upper). Sum of mean score was used for analyses.

RESULTS AND CONCLUSIONS

FIGURE 1:
 GILTS FED MINTREX HAD EARLY TITER RESPONSE TO MYCOPLASMA HYOPNEUMONIAE VACCINE COMPARED TO THOSE FED INORGANIC TRACE MINERALS (POSITIVE TITER ON WEEK 4 COMPARED TO WEEK 12 IN ITM GROUP).

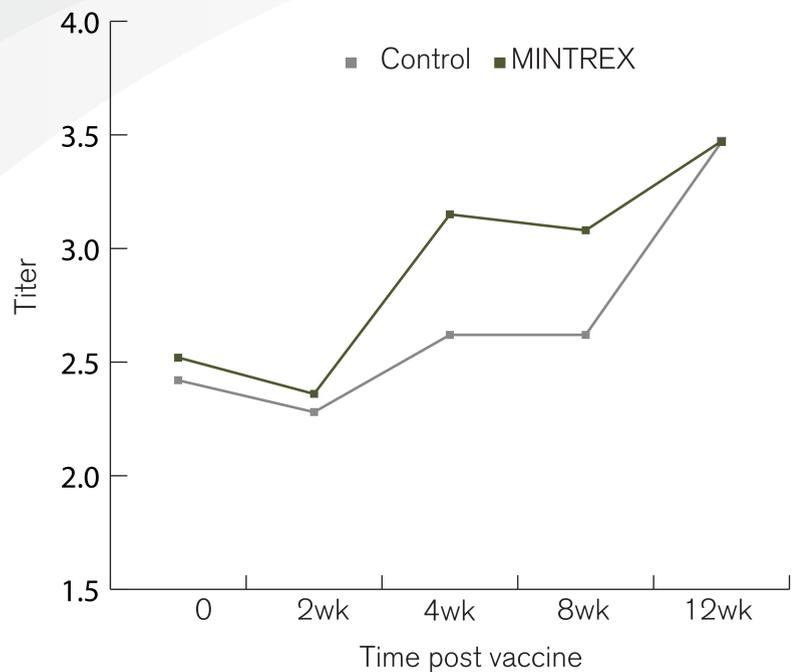


TABLE 1:
 GILTS FED MINTREX HAD LOWER REMOVAL RATE, LESS REMOVAL DUE TO LOCOMOTION, AND LOW MORTALITY COMPARED TO GILTS FED INORGANIC TRACE MINERALS.

variable	MINTREX (n=10725)	Control (n=10729)	SEM	P-Value
Removal rate, %	8.00	8.8	0.002	0.04
Relative Removal reason due to locomotion, %	8.95	13.82	0.005	<0.001
Mortality, %	1.52	2.12	0.002	0.001
Mobility score*	1.80±0.16	2.62±0.22		0.004

* A scale of 0-3 with 0 represents normal health and 3 represents sever lameness was used to evaluate four part of each leg (Toes, Pastern, Knee/Hock, and Upper). Sum of mean score was used for analyses.

- Gilts fed MINTREX had early antibody titer response to *Mycoplasma hyopneumoniae* vaccine.
- Gilts fed MINTREX had lower removal rate and better mobility score.
- Mortality was reduced with MINTREX supplementation. This indicate that gilts fed MINTREX are healthier compared to the control.

REFERENCE

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