

## The Use of a Phytogenic Product to Improve Sows' Lactation Performance

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### ABSTRACT

A field trial was conducted to determine if the lactation diet supplemented with a selected phytogenic product (Biomin P.E.P<sup>®</sup>) would improve sows' lactation performance measuring in terms of average wean-to-first-service interval (WFS) and average daily litter weight gain (ADLWG). One hundred and twelve mixed-parity cross-bred sows were randomly allocated into either a control (n=55) or a treatment (n = 57) group. They were housed in the same barn under the same management regime throughout the trial. Sows received *ad libitum* feeding of lactation diets supplemented with either 2 kg/ton of Biomin P.E.P<sup>®</sup> (treatment) or nil (control). The lactation diet was broken-rice soybean meal-based diet containing 17 % of crude protein, 3,300 Kcal/kg of ME and 1.05 % of dietary lysine. During the 22.6 days of average lactation period, ADLWG of sows in treatment group was significantly improved by 0.117 kg/day (P= 0.0353) and WFS was insignificantly shorter (5.0 vs 6.1; P = 0.2263). In conclusion, the Biomin P.E.P<sup>®</sup> supplemented lactation diet can enhance lactation performance in sows. The increased ADLWG combined with shorter WFS is believed to derive from the increased lactation feed intake.

**Key words:** sows, lactation performance, phytogenic product, feed intake

### INTRODUCTION

The lactation barn is a critical junction between sow and grow-finishing herds since superb performance in lactation barn will result in 2 pre-conditions, which play a crucial role in determining the performance of the whole pig farm. The first pre-condition is heavy and healthy weaned pigs entering the nursery. Ample evidences indicated that heavy and healthy weaned pigs are likely to perform well during the nursery phase and good nursery performance is likely to result in good finishing performance (Mahan and Lepine, 1991; Ilsley *et al.*, 2003). The second pre-

condition is sows in good body condition at weaning entering the mating area. Several reports shown that sows experiencing minimum body weight loss during lactation will provide excellent conception efficiency (Wilson and Dewey, 1994; Udomprasert *et al.*, 1997). In order to improve the performance of lactating sows, the most important strategy is to maximize sow feed intake during lactation. The achievement of such strategy can be observed in terms of decreasing wean-to-first-service intervals (**WFS**) and increasing average daily litter weight gains (**ADLWG**) (Close and Cole, 2000; King, 1998).

The use of herbs and spices in animal feed is gaining popularity since majority of antibiotic growth promoters are banned. Phylogenetic feed additives have been known for their beneficial properties including antioxidative, antimicrobial, fungicidal and physiological activities (Mathe, 1996). The aromatic properties make them particularly suitable for the prevention of performance drops related to inappetite. The notion of natural ingredients being a safe and acceptable option and the classification of EU feed regulation as being flavor and appetizing substances render phylogenetic feed additives a promising alternative.

In hot-humid condition where feed intake is quite often a limiting factor resulting in sub-optimum performance of lactating sows, it is interesting to determine if a selected phylogenetic feed additive (Biomin P.E.P<sup>®</sup>) could improve the lactation performance of sows under farm conditions. Due to the difficulty of measuring feed intake in real-time situation and the possibility of interfering with normal farm process, WFS and ADLWG will be utilized as not only the direct responses of lactation performance but also the indirect responses of feed intake (King, 1998).

## MATERIALS AND METHODS

A farrow-to-finishing operation in Saraburi province having 1,500 sows was chosen for this field trial because of dependable management in the lactation barn. Sow records are maintained on a computerized recording system (Udomprasert *et al.*, 1993) which was used for monitoring and problem-solving activities on a monthly basis. The 6-month rolling averages of pigs weaned/sow/year, litter/sow/year, farrowing rate, number of pigs weaned/litter, lactation length (days) and weaning weight (kgs) are 22.5, 2.3, 84, 9.8, 22 and 6.8, respectively.

One hundred and twelve mixed-parity cross-breed sows (Danish Landrace \* Yorkshire)

were housed in the same barn and received a similar nutritional regime during gestation. Seven days before expected farrowing dates, 112 sows were moved to the farrowing house containing 4 rows of lactation crates of which two were designated as either control (n=55) or treatment (n=57) rows.

The pre-farrowing feed intake was limited to 2 kg while post-farrowing feed intake was *ad libitum*. The lactation diet was formulated to contain 17 % of crude protein, 3,300 Kcal/kg of ME and 1.05 % of dietary lysine and consisted of broken rice, rice bran, soybean meal, full-fat soybean and mineral premix. Cross-foster in one-day old pigs was allowed within the same group. A phylogenetic feed additive, Biomin P.E.P<sup>®</sup>, was added to the treatment diet at the inclusion rate of 2 kg/ton. The samples of control and treatment diets were randomly collected on a weekly basis. These feed samples were submitted to Biomin laboratory in order to determine if the tracer added in Biomin P.E.P<sup>®</sup> would correctly identified the diet, either a treatment or a control.

Farrowing date, number of pigs born alive, birth weights on the farrowing day (kg), weaning date, number of pigs weaned, weaning weights (kg), subsequent service date and culling date along with the culling reason were recorded. The wean-to-first-service interval and ADLWG of each sow were calculated. The percentage of sows in heat within 7 days after farrowing, percentage of sows culled, average weaning weight, average lactation length, born alive litter size and number of pigs weaned per litter were also calculated for each group.

Since ADLWG may increase with litter size (Nielsen *et al.*, 2002), the linear response model (Ott, 1984) were generated to demonstrate the effects of Biomin P.E.P<sup>®</sup> on ADLWG. Let  $Y_i$  be a continuous random variable (ADLWG) where  $i = 1, 2, \dots, 112$ . The model was:

$$Y_i = B_0 + B_1 X_{i1} + B_2 X_{i2} + E_i$$

where

$X_{i1}$  = number of pigs weaned per litter  
 $X_{i2}$  = 1 if treatment group,  $X_{i2} = 0$  otherwise;  
 $E_i$  = random error term

With this model, the effects of adding Biomin P.E.P' on ADLWG will be adjusted for the discrepancy in the number of pigs weaned per litter. The  $B_2$  regression coefficient will give the predicted difference of ADLWG between treatment and control groups. Other response variables will be tested using Student's T-test or Chi-square.

## RESULTS

The effect of Biomin P.E.P' supplement on ADLWG is shown in Table 1. Biomin P.E.P' supplement at 2 kg/ton of lactation diet significantly improved ADLWG by 0.117 kg/day. Other performance parameters tended to improve

as well but were statistically insignificant (Table 2). Biomin laboratory also confirmed the presence of Biomin P.E.P' in the lactation diet fed to sows in the treatment group.

## DISCUSSION

Litter size has a profound impact on milk production and growth rate of suckling pigs. Although birth-to-weaning average daily gain and weaning weight are decreased with an increased number of pigs nursing a sow (Klindt, 2003), ADLWG tends to increase due to higher milk production. This trial also confirmed the notion of previous finding (Nielsen *et al.*, 2002). The higher the number of pigs nursed, the better the ADLWG. The effect of litter sizes nursed on ADLWG was larger than that of Biomin P.E.P' supplement (Table 1). For each additional pig weaned, ADLWG improved by 0.2 kg. Since the number of pigs weaned/litter in treatment sows

**Table 1** Regression coefficients when average daily litter weight gain (kg) was a dependent variable, number of pigs weaned/litter was a covariate and Biomin P.E.P' supplement was a dummy variable (F-ratio = 89.28, df = 109,  $R^2 = 0.6209$ ).

Independent variables	Coefficients	P-values
Intercept ( $B_0$ )	0.2820	0.0462
Number of pigs weaned /litter ( $B_1$ )	0.2036	0.0000
Biomin P.E.P' supplement ( $B_2$ )	0.1168	0.0353

**Table 2** Comparison of performance indices of sows between control and treatment groups. Sows in treatment group received lactation diet supplemented with 2 kg/ton of Biomin P.E.P' , a phytogenic product.

Performance indices	Treatment	Control	P-values
Average wean-to-first-service interval (WFS, days)	5.0	6.1	0.2263
Sows in heat by 7 days after weaning (%)	85.1	80.8	0.5831
Sows culled after weaning (%)	17.5	14.5	0.5173
Born alive litter size (heads)	11.8	11.2	0.1680
Number of pigs weaned/litter (heads)	10.4	9.7	0.0283
Average weaning weight (kg)	7.0	6.8	0.1047
Average daily litter weight gain (ADLWG, kg/day)	2.5	2.3	0.0024
Average lactation length (days)	22.6	22.6	0.9879

was larger, the effect of Biomin P.E.P. would have been overestimated, if the covariate had not been placed in the model. Interestingly, the higher number of pigs weaned/litter of treatment sows did not result in inferior weaning weight (Table 2) as described by Klindt (2003). This effect could be attributable to Biomin P.E.P. supplement.

Evidences from this trial show that Biomin P.E.P. in the lactation diet will improve sow feed intake. The improvement in ADLWG combined with lower WFS and higher percentage of sows in heat by 7 days after weaning were solid enough to testify that the average daily feed intake of sows in treatment group was higher (Close and Cole, 2000). King (1998) has demonstrated a mathematic procedure to translate ADLWG into average daily feed intake of corn-soybean meal-based diets similar to this trial. A 0.117 kg/day improvement in ADLWG is equivalent to additional 3.042 gm of dietary lysine intake/day. This 3 gm of dietary lysine can then be tabulated to 290 gm of feed intake/day when the lactation diet contains 1.05 % of dietary lysine.

The degree of statistical significance of performance indices shown in Table 2 should not be taken as serious as the direction of changes. The average values of more than one performance indices moving in agreement with each other provide a scientific evidence good enough to attest to the increasing lactation feed intake of sows in treatment group. These are decreasing WFS, increasing percentage in heat by 7 days after weaning, increasing piglet weaning weight and increasing ADLWG of sows in the treatment group when compared to those in control group. The degree of statistical significance of performance indices measured could have been higher, had the number of sows in each group been higher. The result from this field trial implies that the effect of Biomin P.E.P. supplement on performance indices other than ADLWG may be relatively small considering the highly variable nature of most performance indices. Therefore, changes in

performance indices in response to the application of Biomin P.E.P. similar to this trial may be difficult to detect in small to medium size farms.

## CONCLUSIONS

The selected phytonic product (Biomin P.E.P.) mixed in the lactation diet at 2 kg/ton can improve sow lactation performance in terms of average daily litter weight gain. With the average lactation length of 22.6 days, the average daily litter weight gain increases by 0.117 kg/day. Changes in performance parameters other than average daily litter weight gain may become evident if a larger number of sows are involved.

## LITERATURE CITED

Close, W.H. and D.J.A. Cole. 2000. **Nurtition of Sows and Boars**. Nottingham University Press. United Kingdom. 377 p.

Ilsley, S. E., L.J. Broom, H.M. Miller and P. Toplis. 2003. Birth weight and weaning weight as predictors of pig weight at slaughter, pp. 31. *In* J.E. Paterson (ed.). **Manipulating Pig Production IX**. Australasian Pig Science Association (INC), Werribee, Victoria, Australia.

King, R.H. 1998. Dietary amino acids and milk production, pp.131-142. *In* M.W.A. Verstegen, P.J. Moughan and J.W. Schrame (eds.). **The Lactating Sow**. Wageningen Press.

Klindt, J. 2003. Influence of litter size and creep feeding on preweaning gain and influence of preweaning growth on growth to slaughter in barrows. **J. Anim. Sci.** 81: 2434-2439.

Mahan, D.C. and A.J. Lepine. 1991. Effect of pig weaning weight and associated nursery feeding programs on subsequent performance to 105 kilograms body weight. **J. Anim. Sci.** 76: 1326-1330.

Mathe, A. 1996. Essential Oils: Basics and applied research, pp. 322-325. *In* C.H. Franz, A.

Mathe and G. Buchbauer (eds.). **Proceedings of the 27<sup>th</sup> International Symposium on Essential Oils**. Allured Publishing Corporation.

Nielsen, T.T., N.L. Trottier, H.H. Stein, C. Bellavers and R.A. Easter. 2002. The effect of litter size and day of lactation on amino acid uptake by the porcine mammary glands. **J. Anim. Sci.** 80: 2402-2411.

Ott, L. 1984. **An Introduction to Statistical Methods and Data Analysis**. Duxbury Press, Boston. 596 p.

Udomprasert, P., K. Urairong, T. Sakpuram and W. Wajjwalku. 1993. The PigLIVE program : A computerized recording system for swine herds. **Kasetsart Anim. Hosp. J.** 4 : 155-171.

Udomprasert, P., K. Urairong, T. Sakpuaram and W. Wajjwalku. 1997. Influence of the wean-to-first-service interval on subsequent farrowing rate and litter size of sows in Thailand. **Kasetsart J. (Nat. Sci.)** 33: 33-42.

Wilson, M.R. and C.E. Dewey. 1994. Maximizing mating efficiency, pp. 30-33. *In* P. Poomvises and P. Ingkaninun (eds.). **Proceedings of the 13<sup>th</sup> IPVS Congress**, Bangkok, Thailand.