

# Effect of Dietary Standardized Ileal Digestible Arginine to Lysine Ratio on the Reproductive Performance, Plasma Free Amino Acid Profile, and Colostrum Composition in Gestating Sows

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**Research**

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# Abstract

**Background:** The objective of the present study was to determine the optimal standardized ileal digestible arginine to lysine (SID Arg: Lys) ratio on the reproductive performance, plasma free amino acids and biochemical parameters of sows during gestation, as well as colostrum compositions and performance of their offspring litter.

**Methods:** A total of 174 multiparous sows (3+ parity, Landrace × Large white) were randomly allocated to five treatment groups with different dietary SID Arg: Lys ratios (0.91, 1.02, 1.14, 1.25 and 1.38) by modifying the supplementation of Arg or alanine (Ala) for isonitrogenous equilibrium. All diets were formulated with the same composition levels including DE at 3.14 Mcal/kg and SID Lys at 0.64%. The reproductive performance of sows during gestation and lactation and the performance of offspring litters during lactation were evaluated. Blood samples were obtained on days 90 and 110 of gestation for analyses of plasma biochemical indexes and free amino acids, and colostrum samples were collected for determination of the composition.

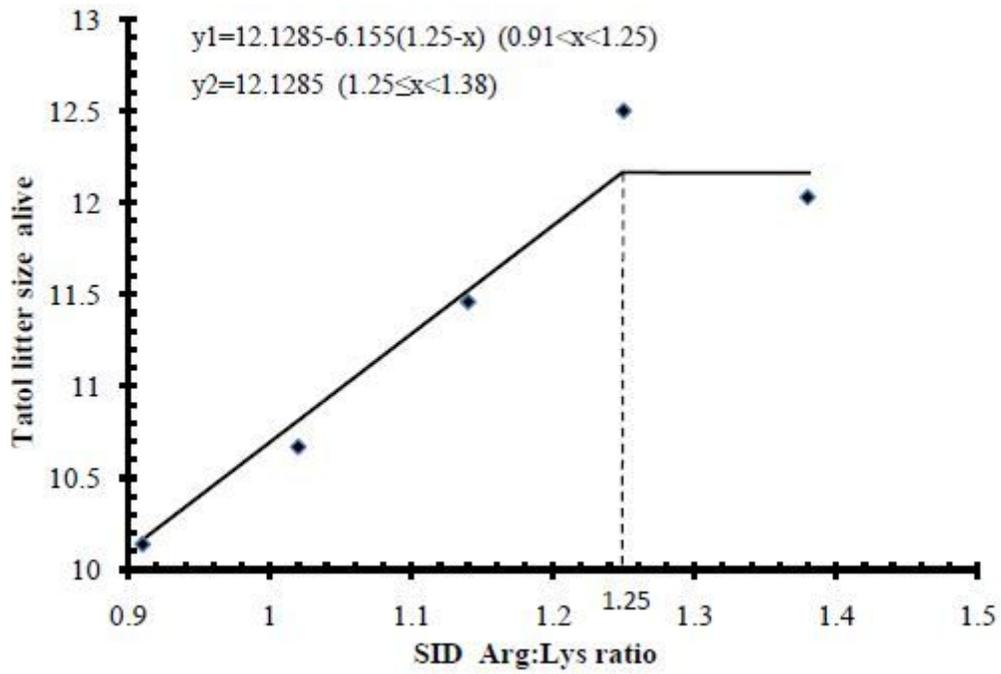
**Results:** The results showed that increasing the dietary SID Arg: Lys ratio increased litter size alive linearly ( $P = 0.001$ ) and quadratically ( $P = 0.001$ ), and decreased the number of stillborns linearly ( $P < 0.001$ ) and quadratically ( $P < 0.001$ ), and decreased the mummified size quadratically ( $P = 0.033$ ). The birth weight variation of born alive was linearly ( $P = 0.002$ ) and quadratically ( $P = 0.008$ ) reduced by increasing the dietary SID Arg: Lys ratio. The broken-line regression analysis indicated that the optimal SID Arg: Lys ratio requirement for gestating sows to maximize the litter size alive was 1.25. Birth intervals were decreased linearly ( $P = 0.025$ ) and quadratically ( $P = 0.013$ ) with increasing the dietary SID Arg: Lys ratio. There were linear and quadratic increases ( $P < 0.05$ ) in the concentrations of colostrum compositions including non-fat solid, total solid, protein, and energy by increasing dietary SID Arg: Lys ratio. The plasma nitric oxide (NO) and total protein in serum were increased linearly as dietary SID Arg: Lys ratio increased. Similarly, sows fed the diet with higher SID Arg: Lys ratio significantly increased the concentrations of plasma arginine in sows at day 90 of gestation and ornithine ( $P < 0.05$ ).

**Conclusion:** Collectively, the current study indicated that increasing the dietary SID Arg: Lys ratio during gestation resulted in the increase of litter size alive, reduction of birth intervals, and improvement of colostrum composition. The requirement of optimal SID Arg: Lys ratio for gestating sows to maximize the litter size alive was 1.25 using a linear broken-line model.

## Full Text

This preprint is available for [download as a PDF](#).

## Figures



**Figure 1**

Fitted broken-line of litter size alive as a function of SID Arg: Lys ratio. Observed mean values in each treatment are shown.