Mammary Gland Growth during Lactation and Its Impact on the Growth of Nursing Pigs

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The sow’s mammary gland is the sole organ for providing nutrients for nursing pigs. Understanding the biology of the sow’s mammary gland is critical for maximizing pig growth rate during lactation. It has been demonstrated that pre-weaning growth of pigs affects post-weaning growth (McConnell et al., 1987; Mahan and Lepine, 1991; Mahan, 1993). Thus, characterizing growth of mammary gland during lactation and understanding its relationship to the growth of nursing pigs may be important for improving pre-weaning growth of pigs.

Substantial growth and development of porcine mammary glands occurs during gestation (Hacker and Hill, 1972; Kensinger et al., 1982). However, the extent mammary gland growth during lactation and the importance of that growth relative to the nursing pig had not been demonstrated previously.

Mammary glands continue to grow during lactation
Fifteen primiparous sows were used to characterize mammary gland growth during lactation (Kim et al., 1999). Sows were killed on d 5, 10, 14, 21, and 28 of lactation and mammary glands were dissected into individual glands. Only mammary glands which were known to be nursed by pigs during lactation were used for chemical analysis.

The wet weight of mammary glands increased 55% from d 5 to d 21 of lactation (Figure 1). The DNA content (mg), which is an indicator of the number of cells in mammary glands, doubled from d 5 to 21 of lactation (Figure 2).

Growth of nursing pigs is strongly related to the nursed mammary gland
We observed 33 litters from primiparous sows to get information about teat ownership during lactation. This allowed us to know which pig nursed which gland. All sows were killed on d 21 of lactation and mammary glands were dissected into individual glands. Each gland was used for chemical analysis.

Larger glands had greater amounts of DNA ($r = .66, P = .0001$), and therefore more cells, than smaller

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glands. Thus, larger glands contained greater amounts of functional tissue than smaller glands which is directly related to milk production. Pigs nursing large glands had a greater growth rate (r = .67, P = .0001) than pigs nursing smaller glands. The correlation (r) between DNA content (mg) in the glands and growth rate of pigs was .54 (P = .0001).

This study demonstrates that porcine mammary glands undergo significant growth during lactation and that this growth of mammary gland is significantly related to the increased capacity for milk production as indicated by the increased mammary wet weight and DNA content. The growth of the mammary glands was related to the increased growth rate of nursing pigs.

References