

## Importance of birth weight and colostrum intake on piglet survival and growth performance

Jeffrey Wiegert and Mark Knauer, Department of Animal Science, North Carolina State University

### Key Points

- Piglet birth weight and colostrum intake are positively associated with pre-weaning survival and weaning weight.
- Compared to piglets of similar birth weight, piglets with greater weight gain within the first day of life showed improved average daily feed intake and average daily gain in finishing and required fewer days on feed to reach market weight.

The sow's uterine capacity is limiting to prenatal fetal development. Genetic selection for greater litter size without concomitant emphasis on piglet quality has therefore increased the total number of piglets born per litter at the expense of decreased average piglet birth weight. Low birth weight pigs are slower growing and at greater risk of preweaning mortality. The reduced prenatal investment of maternal resources (i.e. decreased piglet birth weight) has led us to consider the importance of postnatal maternal resources (i.e. colostrum). Colostrum is the first milk produced after farrowing and serves two fundamental purposes. First, it provides the piglet with sufficient energy to generate metabolic heat for thermoregulation, and secondly it serves as the vehicle for passive transfer of immune cells from the sow to the piglet. Colostrum also contains numerous bioactive growth factors and hormones that promote growth and development. Therefore, our study objectives were to characterize the importance of piglet birth weight and colostrum intake on survivability to weaning, weight at weaning, and to determine the extent to which weight gain within the first day of life may influence lifetime pig performance.

A total of 808 piglets farrowed from 61 second-parity Landrace x Large White sows at the North Carolina Department of Agriculture Tidewater Research Station (Plymouth, NC) were individually tagged at birth and weighed prior to first suckle (BWT) and again at 24 hrs of age. Piglet colostrum intake (CI) was estimated using an equation incorporating the values BWT, 24 hour weight gain (GAIN), and the duration of suckling (Theil et al., 2014). Weaning weight (WWT) was recorded at 21 d of age.

Average piglet BWT and CI was 2.53 lbs. and 411 g, respectively. As expected, piglet BWT was positively associated with both survival to weaning ( $R^2=0.14$ ) and WWT ( $R^2=0.34$ ), such that a 1 lb increase in BWT resulted in a 2.8 lb. increase in WWT. Similarly, positive associations were observed between CI and survival to weaning ( $R^2=0.22$ ) and WWT ( $R^2=0.31$ ). A 1 g increase in CI was associated with an 8.8 g increase in WWT.

The second objective was to determine the influence of GAIN on future growth performance. A subset of pigs ( $n=448$ ) were arranged in four treatments in a 2x2 factorial based on high and low BWT (HBWT and LBWT) and high and low GAIN (HGAIN and LGAIN). Thus, the four treatments were HBWT+HGAIN, HBWT+LGAIN, LBWT+HGAIN, and LBWT+LGAIN. Pen feed intake was recorded from 74 d of age until average pen weight reached 265 lb. ( $n=8$  pigs/pen; 8.4ft<sup>2</sup>/pig). Results of the experiment are presented in Table 1. By 74 d of age, HBWT+HGAIN pigs were 18.5 lbs. heavier than LBWT+LGAIN pigs, and these differences increased by market. Within BWT, greater GAIN improved average daily feed intake (ADFI) and average daily gain (ADG) and decreased age at marketing. Within LBWT pigs, Feed:Gain ratio (F:G) was improved in HGAIN pigs compared to LGAIN.

Collectively, these results suggest that increasing piglet colostrum consumption improves pig survival and growth performance both before and after weaning. Emphasizing good farrowing room management and intensive piglet care may have lasting effects that improve the productivity of the entire farm.

Trait	Treatment			
	LBWT+LGAIN	LBWT+HGAIN	HBWT+LGAIN	HBWT+HGAIN
BWT, lb.	2.04	2.34	2.91	3.05
GAIN, lb.	0.095	0.366	0.109	0.419
WT at 74 d of age, lb.	67.1	78.1	74.4	85.6
ADFI, lb.	6.57	6.68	6.69	6.84
ADG, lb.	2.32	2.38	2.43	2.47
F:G	2.83	2.81	2.76	2.76
Age at Market, days	158.3	153.2	150.4	147.2

**Table 1.** Impact of piglet birth weight (BWT) and day one weight gain (GAIN) on subsequent growth performance.

### References

1. Theil, P.K., C. Flummer, W.L. Hurley, N.B. Kristensen, R.L. Labouriau, and M.T. Sørensen. 2014. Mechanistic model to predict colostrum intake based on deuterium oxide dilution technique data and impact of gestation and pre-farrowing diets on piglet intake and sow yield of colostrum. *J. Anim. Sci.* 92:5507-5519.