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Full Length Research Paper

Estimates of Milk Production and Correlation with Linear Body Measurements of Piglets from Nigerian Indigenous Pigs (Nip), Exotic and the Crossbred Sows

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A study was conducted to estimate milk production and its correlation with body linear measurement of NIP, exotic and the crossbred pigs. Once in a week piglets were separated from their mothers for 1hr and weighed before and after being allowed to suckle its dam to satiety. This was done four times in a day per week. Suckling periods did not exceed 30 minutes. Differences between pre- and post-suckling weights were recorded as estimated milk production of the dam. The results revealed that the parental genotype significantly ($p<0.05$) affected the milk yield. The interaction between genotype and age significantly affected the growth performance of the litters as well as milk yield of their dams. For the first week to third week where the milk yield of sow normally peak, NIP dam continuously outperform both exotic and crossbred dams in terms of milk yield. In contrast litters of NIP dams which have access to milk, however, grow less than litter of both exotic and crossbred dams. At the weaning age of seven weeks, mean weight of crossbred pig was the highest with value of 7.69kg, followed by 6.55kg of exotic and lastly 5.66kg for NIP. There was high correlation between the week of lactation and milk yield with the highest value of 0.95.

Keywords: Milk Production, Piglets, pigs (Nip).

INTRODUCTION

The mammary gland is one of a few tissues in mammals which can repeatedly undergo cycles of growth, functional differentiation, and regression i.e it is elastic in nature. In all species, the basic internal structure of the mammary gland is the same but vary greatly among different species in the number, shape, size and position on the external body surface. Its growth and development occurred pre-partum and post-partum. It is a skin gland where milk biosynthesis takes place (Singh *et al.,* 1993) and James *et al*., 2010 reported that it is structurally spongy. However, mammary regression accompanied with decline in milk yield after peak milk yield have also been reported by Dijkstra *et al.* (1997).

Sows produce large amounts of milk throughout their lactation and they can be milked either by hand or with a milking machine (Hartman and Pond, 1960; Colenbrander *et al*., 1967; Fraser *et al.,* 1985). The visible and measurable sizes of the udder during lactation largely reflect milk secretion capacity in the next lactation cycle (Gülay *et al.,* 2004). There is a general hypothesis that sow milk yield is primarily affected by the demand for milk by suckling pigs during lactation. Heavier pigs are able to

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Table 1. Least square means of interactive effect of genotype and age on body weight of preweaned pigs.

Week	Exotic	crossbred	NIP
1	2.47	1.73	2.30
2	3.43	3.19	3.35
3	3.82	4.13	3.96
4	4.61	4.78	4.41
5	5.22	5.75	4.94
6	5.85	6.67	4.50
7	6.55	7.69	5.66

stimulate a greater milk flow from sows. Fraser (1984) suggested that a larger pig may massage the teat more vigorously before milk ejection, thus achieving a greater blood flow to the teat and thereby bringing more of the limited supply of oxytocin to the mammary gland. The secretion of other lactogenic hormones, such as prolactin, may also be influenced by increased massage of the udder (Algers *et al.,* 1991; James and Osinowo, 2004).

Milk production by the sow is one of the most important factors limiting piglet growth after postpartum (Boyd and Kensinger, 1998). Therefore this study was done to develop a practical and reliable on-farm method of estimating milk production and to relate estimates of milk production and udder measurement of local, exotic and crossbred pigs to preweaning weights of their piglets.

MATERIALS AND METHODS

Study site

The study was conducted at the Institute of Agricultural Research and training, Moor Plantation, Ibadan, Oyo state. The trial was conducted between April 2009 and March 2010 over two parities.

Animals

Two sows of Large White breed, two F_1 crossbreds and three indigenous local sows, were used in this trial. The averaged number of teats for all the breeds was 10 (ranging from 8 to 10). The total number of piglets was 44.

Housing and feeding management.

The animals were reared under intensive management. Sows were housed separately during gestation periods in multi-purpose pens. The sows and their piglets were penned together after far rowing. Feeding was done twice daily, at 8:30 and 14:00 hours respectively. Drinking water was supplied ad-libitum to all the animals in concreted troughs. The piglets were given iron injection between the age of 2 and 4 days.

Beginning at 0800am in the morning, piglets were separated from their mothers for 1hr and weighed before and after being allowed to suckle its dam to satiety. This was done four times in a day per week. Suckling periods did not exceed 30 minutes. Differences between pre- and post-suckling weights were recorded as estimated milk production of the dam. Body weights of the piglets were taken by the use of weighing scale and body measurements were done by the use of measuring tape rule graduated in centimeter and inches.

Statistical analyses

Factorial analysis was used to determine the statistical significance of growth performance of progeny and milk yield of the dam across genotype, weeks, and the interaction. Mean separation of the main effects were done using DMRT.

The data were analyzed by the following general linear model:

$Yijkl = \mu + ai + bj + (ab)ij + eijkl$

Yijkl is the response variables
μ is the overall mean
ai is the effect of genotype
bj is the effect of week
(ab)ij is the interaction effect
eijkl is the random error.

RESULTS AND DISCUSSION

The interaction between genotype and week significantly ($P<0.05$) affected the growth performance of the litters as well as milk yield of their dams as shown in Table 1. The milk yield is a key limiting factor to pre-weaning growth of

Table 2. Least square means of interactive effect of genotype and week of lactation on milk yield of exotic, crossbred and NIP dams.

Week	Exotic	crossbred	NIP
1	6.18	6.19	9.51
2	6.37	5.55	9.46
3	7.57	6.08	9.55
4	6.33	6.08	8.22
5	7.53	5.83	6.51
6	7.64	6.57	6.42
7	7.23	5.45	4.78

Table 3. pearson correlation between the wk of lactation, milk yield and the linear body measurement.

	WL	MY	HL	BL	BH	HGRC	
WL	1						
MY	0.95	1					
HL	0.74	0.89	1				
BL	0.64	0.74	0.79	1			
BH	0.75	0.85	0.87	0.76	1		
HG	0.74	0.81	0.72	0.79	0.68	1	
RC	0.74	0.85	0.79	0.84	0.78	0.86	1

WL= week of lactation, MY=Milk yield, BL=Body length, HL=Head length, RC=Rump circumference, BH= Body height, HG=Heart girth.

piglets and consequently to their post- weaning growth. This is because the crossbred were utilizing heterosis.

The milk outputs of the three breeds were at peaks during the third week of lactation in accordance with the findings of Toner et al., 1996 and Kanchachan, 2007. For the first week to third week where the milk yield of sow normally peak, NIP dam continuously outperform both exotic and crossbred dams in terms of milk yield as shown in table 1. Some factors may be responsible for these. The mammary gland of sows has no large cistern to store milk secreted by the epithelia cells of the alveoli, thereby massaging of the udder will cause increase in letdown of milk (Bjorker, 2003: Algers and Jenkins, 1991). Grandinson (2003) and Björkner (2003) found that aggressive behavior of sows to protect their piglets could be related to milk yield and the NIP is well known for this character.

In contrast litters of local dams which have access to abundant milk, however, grow less than litters of both exotic and crossbred dams. The estimated milk yield of local dams which was higher than that of exotic and crossbred dams was probably because of its ability to convert its improved feed to milk efficiently than others.

At the weaning age of seven weeks, mean weight of crossbred pig was the highest with value of 7.69kg, followed by 6.55kg of exotic and lastly 5.66kg for local.

The correlation between the week of lactation, milk yield and other parameters measured were shown in table 3 where there was high correlation between the week of lactation and milk yield with the highest value of 0.95. There was a high correlation between the week of lactation and the milk yield, as the week of lactation increases.

CONCLUSION

The superior growth performance of litters from crossbred was probably due to hybrid vigour. The lower weight of the local piglets with regards to comparatively high milk

production of local dams may be due to their intrinsic poor genetic potentials for growth

The milk yield of local dams which was higher than that of exotic and crossbred dams was probably because of its ability to convert its improved feed to milk efficiently than others.

There is high correlation between the milk yield and the linear body measurement and also on the week of lactation.

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