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EFFICIENCY OF FEED AND MILK UTILIZATION BY LITTERS OF INDIGENOUS AND EXOTIC PURE AND CROSSBRED PIGS

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Studies on 28 pigs, made up of 2 sows and 2 gilts each from 3 purebred (Indigenous breed, Large White, Landrace) and 4 crossbred lines (Duroc x Large White, Duroc x Landrace, Large White x Landrace and Landrace x Large White) showed mean feed consumption within the range 54 to 121 kg for the indigenous and Large White x Landrace sows respectively, and milk production range 79 to 176.4 kg for the Indigenous and Duroc x Large White sows respectively during a 56 day lactation. Litter sizes ranged from 5.8 to 9.9 pigs for Landrace and Landrace x Large White respectively. Significant differences were noted between genotypes in the amount of feed consumed during lactation, milk consumption/kg/litter liveweight gain ($P < 0.01$), milk produced, feed consumption by sow/kg litter gain and creep feed/kg litter gain by litter ($P < 0.05$). No difference was observed in feed intake by sows/kg milk produced.

Key words: Pigs, milk, intake, indigenous breed, exotic breeds, tropics

Williamson and Payne (1965) suggested that a sow, suckling 8 pigs, should receive 6.35 kg/d of a feed containing 17% crude protein (CP) and the creep 20-25% CP, although experiments on sow feeding by Smith (1959) have shown that in a ration consisting entirely of skimmed milk, the quantity of 6kg plus 1 kg feed/piglet suckled often exceeded the appetite of the sow especially in the case of first litter gilts and sows suckling more than 6 pigs.

The problem is further accentuated in the summer months when a high environmental temperature depresses appetite which may be an important factor under tropical conditions where exotic pigs are raised. It is therefore necessary to evaluate feed and creep intake of sows and piglets of different genotypes in order to compare the efficiencies of pig production under tropical climates.

Materials and Methods

Animals: 28 animals comprising 2 sows and 2 gilts each from 7 genotypes: purebred Large White (LW), Landrace (LR) and Indigenous (Ind)pigs and crosses of Duroc with Large White (DU.LW) and Landrace (DU.LR) and reciprocal crosses between Large White and Landrace (LW.LR and LR.LW) were fed from farrowing to weaning at 8 weeks on the ration shown in Table 1.

The sows were fed the ration at the rate of 2.7 kg per sow and 0.23 kg per piglet suckled, in 2 parts daily as a slurry with water, morning and afternoon. The piglets were fed ad libitum, their refusals being weighed at the end of each week. Water was freely available.

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Table 1:

% composition of sow feed and creep feed available from farrowing to weaning

Feed component	Sow feed	Creep feed
Maize	62.5	54.5
Groundnut	18.00	22.00
Bloodmeal	5.00	6.00
Rice bran	6.00	3.00
Brewers grains	5.00	-
Fish meal	-	4.00
Bone meal or Dicalcium Phosphate	1.75	2.00
Oystershells	0.75	0.75
Salt	0.50	0.25
Palmoil	0.50	-
Vit - Min Premix[a]	-	5kg/ton
Analysed Crude Protein % DM	17.5	20.20
Analysed Crude Fibre % DM	3.6	2.75
Analysed Dry matter %	87.7	88.9

[a] Pfizer product supplying the following vitamins per kilogram of diet. A 9323 IU; D 1965 IU; B_{12} 10 mg/ton; riboflavin 41 mg; niacin 246 mg; Pantothenic acid 98 mg; folic acid 10 mg and the following trace elements per kilogram of diet: Manganese 341 mg; Copper 244 mg; Zinc 100 mg; Iodine 20 mg and oxy-tetracycline hydrochloride 20 mg per ton

Milk production of the sows was estimated indirectly at 7 day intervals from farrowing until weaning of the piglets at 56 days. The piglets were batch weighed before and after suckling at 40 minute intervals during the first two weeks, hourly intervals from weeks 2 - 5 and at 75 minute intervals during the last three weeks of lactation, during a 12 hour period of the day.

From these measurements weekly milk production was estimated. Milk samples were taken on 2 consecutive days at weekly intervals. Composite samples were analysed for protein, fat, total solids, lactose, ash, calcium and phosphorus. Feed samples were analysed weekly for dry matter, protein and fat content.

Results

Milk production: Data relating to composition of milk are summarised in Table 2. A significant difference ($P < 0.01$) was noted between genotypes in the amount of feed consumed during the eight week lactation. Average feed consumption varied from 54.3 kg in the indigenous to 121 .3 kg in the LW.LR cross (Table 3).

56-day lactation yield ranged from 79.4 kg in the indigenous to

Table 2:
Average milk composition

Parameter	Purebreds			Crossbreds			
	IND	LW	LR	DU.LW	DU.LR	LW.LR	LR.LW
Litter size	6.5	7.9	5.8	9.0	8.1	9.1	9.9
Total solids	22.4	19.4	19.7	20.1	20.8	20.8	21.3
Protein	6.9	6.3	6.4	5.9	6.6	6.6	6.7
Fat	9.3	6.9	6.9	7.8	8.2	8.2	8.7
Lactose	5.4	5.4	5.7	5.5	5.2	5.3	5.3
Ash	0.83	0.71	0.73	0.75	0.80	0.82	0.78
Calcium	0.47	0.28	0.27	0.33	0.32	0.31	0.31
Phophorus	0.19	0.14	0.14	0.15	0.16	0.14	0.14

Table 3:
Sow productivity in a lactation of eight weeks

	Purebreds			Crossbreds				
	IND	LW	LR	DU.LW	DU.LR	LW.LR	LR.LW	SE ±
Feed consumption/ sow (kg)	54.3 aefghi	112.2 e	95.7 bi	105.4 dg	98.5 eh	121.3 abcd	111.5 f	11.48**
Milk production/ sow (kg)	79.4 adfgh	140.8 ch	120.0 be	176.4 abc	149.1 g	153.2 f	171.0 de	15.25**
Feed consumed/ sow/kg milk	0.70	0.88	0.91	0.62	0.65	0.82	0.65	0.15
Feed consumed/sow/ kg litter gain	4.00 abcde	3.59 e	3.83 fghi	2.22 di	2.10 bg	2.19 af	2.17 bg	0.42
Milk consumption/ kg litter gain	6.06 abcde	4.23 e	4.82 fghi	3.24 di	3.10 bg	2.74 af	3.17 ch	0.49**
Creep feed consumed/kg litter gain	0.56 abcd	0.24 b	0.36 af	0.16 aef	0.29 e	0.33 c	0.44 e	0.09*
Feed consumed by sow and litter/ kg litter gain	4.56 abcde	3.83 e	4.19 fgh	2.37 bg	2.34 af	2.52 ch	2.61 d	0.59*
Weight lost	22.2	34.3	23.2	40.6	44.2	37.4	33.2	7.00
Number of animals	4	4	4	4	4	4	4	

* = $P < 0.05$
** = $P < 0.01$
a-i = mean followed by similar constants differ significantly from each other

176.4 kg in the DU.LW. with litter sizes of 5.8 - 9.9 for the LR and LR.LW respectively. Feed consumption by the sows per kg milk produced ranged from 0.62 kg in the DU.LW to 0.91 in the LR sow; the difference was not significant ($P > 0.05$).

Efficiency of gain: Feed consumed by sows/kg litter gain varied from 2.1 kg in the DU.LR cross to 4.0 in the indigenous pigs, The breed differences were significant ($P < 0.05$) between the crossbreds and the purebreds. There were no significant differences between the crossbred sows, but within the pure bred group the LW sows required less feed/ kg of litter gain than the indigenous sows ($P < 0.05$).

The efficiency of the liveweight gain of the piglets during the suckling period is indicated by the amount of milk and creep consumed /kg liveweight gain. The differences between milk and creep consumed / kg liveweight gain were significant ($P < 0.01$ and $P < 0.05$ respectively)

The crossbreds required between 2.7 and 3.2 kg milk/kg liveweight gain while the pure breds required 4.2 - 6.1 kg. The DU.LW pigs needed 0.16 kg creep feed/kg gain compared to 0.56 kg for the indigenous pigs. In evaluating feed consumed by both sow and litter/kg pig gain (minus milk), significant differences were observed among genotypes ($P < 0.05$). The indigenous and LR were the least efficient with intakes of 4.6 and 4.2 kg respectively followed by the LW, while the crossbreds had intakes of 2.3-2.6 kg with no significant difference between these values.

Analyses of the milk in order to establish a conversion ratio be - tween milk nutrient and feed nutrient (Table 4) - mainly protein , fat, dry matter and ash of both feed and milk - revealed efficiency of con - version of dry matter in feed to total solids of 27% in the pure - bred exotic to 37% in the Duroc crosses, 32% for the reciprocal crosses and 37% for the indigenous sows.

Table 4:

Efficiency of conversion of feed nutrients to milk nutrients %

Parameters	Genotype						
	IND	LW	LR	DU.LW	DU.LR	LW.LR	LR.LW
Total solids	36.8	26.9	27.6	38.4	36.6	30.2	35.3
Ash	40.4	15.3	15.3	18.8	20.3	17.7	24.2
Protein	63.0	47.0	47.5	64.1	60.4	54.5	63.6
Fat	316.7	241.3	213.7	304.5	304.4	251.2	303.9

Conversion of feed ash to milk ash was very low, 15 - 24% for the exotic pigs and their crosses and 40% for the indigenous pigs, while conversion of feed protein to milk protein was very high with 47% for the purebred exotic, 63% for the indigenous, 62% for the Duroc crosses and 59% for the reciprocal crosses. The most striking result was the conversion of feed ether extract to milk fat. The milk fat yield was two to three times the amount offered in the feed.

Discussion

These data reveal that the indigenous pigs with all attending condemnation were quite efficient in converting feed to milk and compared favourably with the others in the efficiency of conversion of feed to liveweight gain.

The Duroc X LW crosses that produced the largest volume of milk and required the least amount of feed/kg milk produced, as a result showed a high body weight loss during lactation. It has been generally accepted that inadequate intake of fat and other nutrients does not limit milk production because the impulse to secrete causes mobilization of the body reserves. The amount of feed consumed and the changes in body weight during lactation depend on the condition of the sow at the beginning of the lactation. Fat sows have been found to consume less feed during lactation and lose more weight than thin sows. The energetic efficiency of lactation is highest when milk is produced directly from feed energy rather than from the mobilization of body fat depos - its. Therefore in practice the greatest efficiency of energy utilization might be achieved by controlling energy intake during ges - tation to minimise fattening and by feeding higher amounts of energy during lactation to minimise mobilization of deposited fat for milk production.

Gross efficiency of conversion of dietary protein to milk protein when adequate energy was provided was put at 33% (ARC 1967) which is just about half the efficiency of protein utilisation reported in this study.

In the present study the indigenous breed produced richer milk (high fat, protein and total solids) but had a lower milk production . The fact that the sows change in weight during lactation depends not only on the quantity of milk but also on its composition, as was shown in the indigenous breed where almost 35% of its initial body weight was lost during lactation. This same breed effect was noted by Fahmy(1972) in which he reported higher weight loss in sows with milk with high total solids and reported that these sows generally had better litters at weaning than those of inferior milk composition.

The between litter analysis shows considerable variability in weaning weight between piglets of the same litter, arising from differen - ces in birth weight and milk consumption. Reduction of this variability could be of practical and experimental value but it is uncertain what steps should be taken to produce more uniform litters at weaning. This could possibly be done by manipulating qualitatively the feed supplied, so that pigs are encouraged to take more supplementary feed.

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