

CROSSBREEDING THE NIGERIAN INDIGENOUS PIGS. EFFECT OF  
CROSSING AND EARLY WEANING ON SOW PERFORMANCE<sup>1</sup> /

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Resumen

*Durante los años de 1979 a 1981 se estudió el comportamiento reproductivo del cerdo híbrido indígena de Nigeria, comparándolo con hembras de la raza pura Large White y con el híbrido Large White x Hanshire. Las características estudiadas fueron el peso de los lechones al nacer y a los 56 días, el tamaño y peso de las camadas al nacer y a los 56 días, el intervalo entre el parto y el celo y entre partos consecutivos, el promedio de lechones en las camadas, promedio de las camadas producidas por hembra, por año y total de lechones producidos por hembra, por año con edades al destete de 28, 42 y 56 días, considerando 5 partos consecutivos.*

*Con excepción del ciclo estral y el intervalo entre partos, hubo diferencias significativas entre los periodos de lactancia.*

*Sin embargo, diferencias raciales significativas ( $P < 0.05$ ) se observaron en cuanto al total de lechones destetados, total de vida reproductiva, intervalos entre destete y celo, entre partos y monta y camadas producidas por hembra por año. Con relación al promedio de las razas, las hembras Hanshire cruzadas tuvieron cerca de un tercio de cerdo más por camada que los Large White puros, retornan al celo aproximadamente dos días antes después del destete y reducen en 3 días el periodo entre partos produciendo cerca de medio cerdo extra por hembra por año.*

*Por otro lado, la hembra híbrida indígena, con una reducción de aproximadamente 1 cerdo por camada producida, presenta un retorno al celo 7 días más pronto comparado con las líneas exóticas ( $P < 0.05$ ) y un ciclo entre partos menor en 9 días ( $P < 0.01$ ) y produce 0.13 camadas por hembra por año por encima de las dos camadas observadas para la raza pura Large White; por lo tanto, la producción de cerdos al año es únicamente dos tercios de cerdo menor.*

*La reducción del periodo de lactación produce un intervalo entre parto y monta de 13 a 26 días más corto y cerca de 4 a 15 días menos en la vida reproductiva necesaria para producir 5 camadas consecutivas por hembra.*

*Algunos de estos atributos del potencial reproductor de la línea híbrida indígena deberían ser explotados.*

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Introduction

**T**he number of pigs marketed per sow per year is the most important factor for the commercial pig producer. It is usually more profitable to raise two litters from each sow each year; therefore, a practical goal will be to farrow more pigs per sow per

year by shortening the interval between parturitions without lowering conception rate and litter size. Several investigators have studied the effect of lactation length on sows reproductive performance (1, 2, 3, 5), each studying factors ranging from oestrus in suckling and non suckling sows to reproductive performance subsequent to weaning piglets at birth

This study was conducted to investigate the general effect of reduction in lactation length, to evaluate the performance of the Nigerian Indigenous crossbred pig line and to examine areas to exploit the reproductive potential of the Nigerian Indigenous pigs

### Materials and methods

A total of 45 sows were used between 1979 and 1982 comprising 15 sows each of the exotic and Indigenous crossbred dams and the pure Large White with 5 sows per breed from each group weaned at 28, 42 and 56 days of age respectively. They were penned in three groups according to breed and age at weaning, standardized to their age at first oestrus. The crossbred sows were first crosses between the Large White and Hampshire breed (Lw Ha) as the exotic and the Large White x Indigenous breed

(Lw In) respectively. The foundation stock of the exotic breeds were imported into this herd (Institute of Agricultural Research and Training pig herd) as far back as 1974 while the Indigenous pigs were brought in 1977. The Indigenous were those pigs which are assumed to have originated in the West African Coastline region, characterized by their multiple colour combination, smallish size and narrow scraggy conformation, condemned as being of little or no commercial value but which are now being evaluated for their commercial attributes through crossbreeding.

All sows were housed and group fed in indoor concrete floored pens equipped with self feeder and concrete water trough. They were fed 2.6 kg commercial breeders ration (Table 1) twice daily and watered *ad libitum*.

Each sow was served twice within 24 hours of heat. A sow is removed from her group a week prior to farrowing and penned separately in the farrowing crate where there are provisions for creep feeding and nest boxes to provide warm area for the piglets. After farrowing, the sows were fed 3.2 kg of feed per day plus additional 0.3 kg per day per piglet suckled above 5 piglets. The piglets were creep fed from second week of age on a 20% crude protein ration.

Table 1. Percent composition of sow breeders diet and creep feed available from farrowing to weaning

Feed Component	Sow feed	Creep feed
Maize	62.5	54.5
Groundnut	18.00	22.00
Blood meal	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
Oyster shells	0.75	0.75
Salt	0.50	0.25
Palm oil	0.50	—
Vit-min premix <sup>1</sup>	—	0.5 kg/ton
Protein %	16.59	20.20
Calculated Energy MJ, DE/kg <sup>2</sup>	11.05	12.85
Ca %	0.75	0.82
P %	0.68	0.74
Lysine %	0.72	1.04

1 Pfizer product supplying the following vitamins per kilogram of diet: A 9323 iu; D 1965 iu; B<sub>12</sub> 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 Oxytetracycline hydrochloride 20 mg per ton

2 Energy was calculated using the formula:

$$\begin{aligned} \text{DE (mg/kg)} &= 14.2 - 0.45 (\text{CF} \%) + 0.25 (\text{L} \%) \\ \text{CF} \% &= \text{percent crude fibre (Ref. 8)} \\ \text{L} \% &= \text{percent fat in diet (Ref. 8)} \end{aligned}$$

Table 2. Least square means for some production parameters.

	df.	Total life spent	Total pigs born	Pigs/sow/year	Weaning oestrus	Part – Part
<b>Source of variation</b>						
Lactation	2	1 192 704	7 448	0 008	11 024	18 534
Breed	2	28 236 926	125 778	3 008	111 125	189 291
Breed x lactation	4	862 481	2 222	0 282	18 217	10 966
Animal within breeds	4	24 544 037	22 333	6 354	338 400	518 847
Lactation x animals	8	629 593	6 111	0 711	9 599	15 635
Breed x animals	8	616 481	14 278	1 559	34 670	40 718
Breed x lactation x animals	16	1 013 204	2 806	2 130	23 904	22 376

### Statistical Analysis

The data was analysed using the IITA RS TS VI crisp model. The model being  $y_{ijk} = \mu + L_i + B_j + (BL)_{ij} + E_{ijk}$  for factors due to lactation lengths ( $L_i$ ) breed of dam ( $B_j$ ); the interaction effect ( $(BL)_{ij}$ ) and  $E_{ijk}$  the random normal deviate. Differences between means were compared by the Duncan's multiple range while deviation in performance was estimated by least square means (Table 2)

### Results

There were insignificant differences in the performance of the sows within the periods of lactation for most traits studied (Table 3) but significant ( $P < 0.05$ ) breed effect on pigs raised to 56 days of age, total reproductive life spent by the different dams, interval between weaning and oestrus and between parturitions and subsequent mating

Highly significant ( $P < 0.01$ ) breed effect was similarly recorded for the total pigs born within the period, average pig 56 days weight but no differences were recorded in the total litter born, individual pigs birth weight and the number of pigs produced per sow per annum

### Lactation length

Dams weaned at 42 days of age had on the average more pigs born and weaned over the total reproductive period (Table 4); 8 49 pigs born as against 8 13 and 8 38 of dams weaned at 28 and 56 days of age and 7 64 weaned compared to 7 51 for the other periods. There were insignificant differences in the average pig birth and recorded weights at 56 days of age with values of 1 51, 1 57 and 1 60 kg at birth and 8 22, 8 21 and 8 35 kg respectively for

28, 42 and 56 days of age indicating only minor reduction in the animal weights with reduction in lactation length

On the contrary more litters though insignificant were farrowed per dam per annum and slightly more pigs too were raised per dam when lactation length was reduced to 28 days with values of 2 18 compared to 2 14 in other periods and 16 38 compared to 16 32 and 16 33 pigs produced with 42 and 56 days weaning. Although the interval between weaning and return to oestrus was insignificant between the periods, significant decreases ( $P < 0.05$ ) were recorded between parturition and mating and interval between subsequent parturition with values ranging from 43 to 69 days and 158 to 183 days respectively. The least square estimates (Table 5) revealed that the reduction in lactation length resulted in 13 to 26 days reduction in days between parturitions and matings with a resultant 4 to 15 days reduction in total reproductive life spent to produce 5 litters per dam

### Effect of crossing

Significant breed differences were recorded in almost all traits studied except for the average pig birth weight and the total number of pigs born per dam per annum (Table 6)

Highly significant breed differences ( $P < 0.01$ ) were recorded for the average litter size at birth with values of 8 60, 8 91 and 7 49 pigs born by the pure Large White, the crossbred Hampshire and the crossbred Indigenous pigs respectively, the Indigenous breed significantly differing from the others. Similar differences were recorded for the pigs weight at 56 days with values of 8 55, 8 99 and 7 25 kg. Significant breed differences ( $P < 0.05$ ) were also recorded for other traits such as the total

Table 3. Significance of effects.

	TLS	IPB	IPW	Av PB Wt	Av PW Wt	RLS	P/S/Y	L/S/Y	W-Oe	Part-Mat.	Part-Part.
Lactation lengths	N S	N S	N S	N S	N S	N S	N S	N S	N S	N S	N S
Breed	**	**	*	**	**	*	N S	N S	N S	N S	*
Lactation x breed	N S	N S	N S	N S	N S	N S	N S	N S	N S	N S	N S
Animals	**	N S	N S	N S	N S	N S	N S	N S	*	*	*
Lactation x animals	N S	N S	N S	N S	N S	N S	N S	N S	N S	N S	N S
Breed x animals	N S	N S	N S	N S	N S	N S	N S	N S	N S	N S	N S
Lactation x breed x animals	N S	N S	N S	N S	N S	N S	N S	N S	N S	N S	N S

TLS	=	Total life spent
IPB	=	Total pigs born
IPW	=	Total pigs weaned
Av P B Wt	=	Average pigs birth weight
Av P W Wt	=	Average pigs weaning weight
RLS	=	Reproductive life spent
P/S/Y	=	Pigs per sow per year
L/S/Y	=	Litter per sow per year.
W - Oe	=	Weaning date to oestrus
Part - Mat	=	Parturition to mating (days)
Part - Part	=	Parturition to parturition
*	=	P < 0.05
**	=	P < 0.01

Table 4. Performance in relation to lactation length.

	A	B	S	S.E. of Mean	Significance
Lactation lengths (days)	28	42	56	---	---
Sows	15	15	15	---	---
Average pig born (5 lactations)	8.13	8.49	8.38	0.41	N S
Average pig raised to 56 days	7.51	7.64	7.51	0.48	N S
Average pig birth weight (kg)	1.51	1.57	1.60	0.058	N S
Average pig 56 days weight (kg)	8.22	8.21	8.35	1.74	N S
Total reproductive					
Life spent (years)	2.31	2.34	2.30	0.08	N S
Litters/sow/year	2.18	2.14	2.14	0.043	N S
Pigs/sow/year	16.38	16.32	16.33	0.66	N S
Intervals: (days)					
Weaning - oestrus	14.78	13.47	12.58	2.54	N S
Parturition - mating	43.11 a	55.47 b	68.58 c	3.04	*
Parturition - Parturition	157.58 a	169.23 b	182.79 c	2.98	*

\* = P &lt; 0.05.

a - c = Means followed by a different superscript differ significantly

pigs raised to 56 days, the total reproductive life spent, interval between weaning and subsequent oestrus, total litter produced per dam per annum, the interval between parturitions and matings. The least square estimates revealed the improvement attained through crossbreeding the Large White pigs with either the Indigenous or exotic pig (Table 7). There were increases in the birth weight of the pigs

(0.12 kg), earlier return to oestrus (2.42 days) and interval between parturitions (2.82 days) and a significant ( $P < 0.05$ ) increase in number of pigs per dam per annum (0.54) when crossed with the Hampshire dams.

On the other hand, crossbreeding with the Indigenous pigs gave a reduction of about 1 pig per litter

Table 5. Deviation in lactation lengths.

	Lact. 3 - 1			Lact. 3 - 2		
	Difference	S.E.	Significance	Difference	S.E.	Significance
Part - Part	25.21	4.27	**	13.56	1.83	*
Part - Mat	25.47	3.84	**	13.11	2.54	*
W - Oe	- 2.20	0.113	N S	- 0.89	0.11	N S
P/S/Y	- 0.05	0.015	N S	0.01	0.005	N S
L/S/Y	- 0.04	0.003	N S	0.00	-	N S
RLS	- 0.01	0.001	N S	- 0.04	0.002	N S
Av PB Wt	0.09	0.049	N S	0.03	0.012	N S
Av PB	0.25	0.068	N S	- 0.11	0.019	N S

\* = P &lt; 0.05

\*\* = P &lt; 0.01

Table 6. Breed Performance.

Breeds	A	B	S	S.E. of Mean	Significance
Sire	Lw.	Lw	Lw	-	-
Dams	Lw	Lw x Ind	Lw x Hamp	-	-
Sows	15	15	15	-	-
Litters	15	75	75	-	-
Average litter size (birth)	8.60a	7.49b	8.91a	0.65	**
Average pigs raised to 56 days	7.67a	7.09b	7.91a	0.51	*
Average pig birth weight (kg)	1.54	1.48	1.66	0.03	N S
Average pig 56 days weight (kg)	8.55a	7.25b	8.99a	0.16	**
Total reproductive life (years)	2.35a	2.25	2.34a	0.16	*
Litter/sow/year	2.09	2.22	2.13	0.30	N S
Pigs/sow/year	16.37	15.76	16.91	1.39	N S
Intervals (days)					
Weaning - oestrus	16.59a	9.73b	14.50a	1.44	*
Parturition - mating	58.92a	51.73b	56.50a	1.57	*
Parturition - parturition	173.76a	164.79b	170.94a	1.104	*

\* = P &lt; 0.05

\*\* = P &lt; 0.01

a - b = Means followed by similar superscripts are not significantly different

produced (1.12), but with significant advantages of earlier return to oestrus (7.19 days), interval between parturitions (8.97 days), litter per dam per annum (0.13) and over-all 10% reduction (0.10 years) in total life spent to produce 5 litters

### Discussion

In experiments where the reproductive potential of pigs had been evaluated, only small differences were observed in litter productivity of sows when pigs were weaned early (4, 5, 6, 7). Reduction of the

interval between parturitions without lowering conception rate was also reported (3). Similarly, linear decreases in number of days from weaning to oestrus was reported by most workers (1, 2) as lactation lengths increased

Similar results were reported by Moody and Spears (6) though not statistically significant. Early weaning definitely leaves the sows in a better condition to rebreed than prolonged nursing till 56 days; the piglets adjust earlier to rearing conditions when weaned to good quality weaners diet or milk substitutes

Table 7. Deviation over purebred Large White performance.

Breed	Lw - Lw x ha			Lw - Lw x Ind.		
	Difference	S.E.	Significance	Difference	S.E.	Significance
Litter size	-0.31	0.07	NS	1.12	0.50	NS
Birth weight	-0.12	0.028	NS	0.06	0.018	NS
Total life spent (years)	-0.01	0.005	NS	0.10	0.063	*
Litter/sow/year	-0.042	0.023	NS	-0.13	0.024	*
Pigs/sow/year	-0.54	0.49	NS	0.61	0.28	NS
Intervals						
Parturition - oestrus	2.42	0.44	NS	7.19	1.57	*
Parturition - parturition	2.82	1.10	NS	8.97	1.04	**

\* =  $P < 0.05$ \*\* =  $P < 0.01$ 

Conclusions from these results indicated that average litter produced per dam per annum could be increased by shortening lactation. Although total number of pigs produced was not marginally different, the breed differences showed some advantages in the utilization of Indigenous pigs in crossbreeding with shorter recycling period, shorter gestation length and a cumulative advantage in the total days spent to produce 5 litters which were 1076, 1080 and 981 days respectively for the purebred, the crossbred exotic and the crossbred Indigenous respectively ( $P < 0.01$ ), which could lead to significant reduction in the total cost of producing these pigs. The fact that there was no significant interaction between the lactation length and the breed made it mandatory for further study of the economic value derivable from reduced lactation lengths in terms of feed and space saved per dam under efficient herd management and strict culling procedure.

### Summary

The reproductive performance of the crossbred Nigerian Indigenous pigs was studied in comparison with the purebred Large White and the crossbred Large White x Hampshire dam lines between 1979 and 1981. Traits studied were the birth weight of the piglets, litter size at birth, litter weights at birth and at 56 days, interval from parturition to oestrus, interval between consecutive parturitions, average litter produced per dam per annum and total piglets produced per dam per annum at weaning ages of 28, 42 and 56 days within five consecutive parities.

Except for the oestrus cycle and interval between parturition there were no significant differences between the lactation lengths. However, significant

breed differences ( $P < 0.05$ ) in total pigs weaned, total reproductive life spent, intervals between weaning and oestrus, between parturitions and mating and litter produced per dam per annum were recorded.

On the breed average the Hampshire crossed dams had about one third more pigs per litter than the pure Large White, approximately 2 days earlier return to oestrus after weaning and 3 days shorter interval between parturition with approximately half a pig extra produced per dam per annum.

On the other hand, the crossbred Indigenous dam with a reduction of about 1 pig per litter produced, had a significant ( $P < 0.05$ ) 7 days earlier return to oestrus compared to the exotic lines, and a corresponding highly significant ( $P < 0.01$ ) 9 days shorter cycle between parturition, producing 0.13 litters per dam per annum over 2 litters recorded for the pure Large White thereby resulting in only approximately two-thirds lesser pigs produced per dam per annum.

The reduction in lactation length resulted in 13-26 days shorter interval between parturitions and matings and about 4-15 days in total reproductive life spent to produce 5 consecutive litters per dam.

Some of these significant attributes of the reproductive potential of the Indigenous crossbred line must further be exploited.

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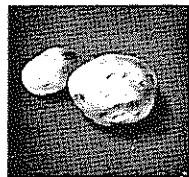


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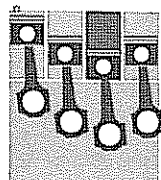
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