STUDIES OF MANAGEMENT EFFECTS ON FERTILITY OF PUREBRED AND CROSSBRED EXOTIC GILTS IN TWO BREEDING FARMS AT NSUKKA, NIGERIA

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ABSTRACT

Sixty healthy gilts comprising 15 Landrace (LR), Large White (LW) and LW x Hampshire (HS) breeds respectively, were selected from Federal Government (FG) breeding center at Okpuje near Nsukka and University of Nigeria Nsukka (UNN) farms. They were bred through 4 years (1993 to 1996) during which management effects on fertility were assessed. Gilts were mated on observation of third cyclic oestrus and at subsequent postweaning oestrus. Fertility was assessed from vital reproductive traits due to dams and offsprings. All gilts had successful first and second parity breeding. Thereafter there were increasing cases of abortion and anoestrus particularly among purebred groups in FG farms. Generally, 8 (53.3%), 6 (40.0%), 10 (66.7%) and 13 (86.7%) out of 15 dams in respective groups could attain fifth parity within four years. Both groups exhibited long breeding intervals (ranging from 192-268 days). Purebred LW and LR offspring had slightly lower mean litter size of 8.5 ± 1.8 and 8.8 ± 1.5 compared with 9.5 ± 0.9 and 9.7 ± 1.4 ($P < 0.05$) for LW x LR and LW x HS crossbred counterparts respectively. Birth and weaning weights and daily weight gain were similarly lower for purebred than crossbred offsprings. Attendant mortality rates of 13.1% and 15.7% for the former were significantly higher than 9.8% and 10.1% (< 0.05) obtained for the latter offsprings respectively. The FG farm was more understocked, underutilized and undermanaged than the UNN farm probably because of inconsistencies arising from administrative bureaucracy. Consequently constraints are identified for

improvement through efficient resources inputs, staff incentives and application of modern strategic management techniques re-commended for tropical environment. Further research into stocking Hampshire crossbred pigs in the tropics is suggested, in view of its favourable performance.

Keywords: Exotic pigs, management, fertility, production, tropics.

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INTRODUCTION

Advocates for upgrading indigenous with improved exotic breeds in the tropics instead of rearing exotic pigs (Fetuga *et al.*, 1976; Adebambo, 1986) emphasize sustained adaptation to harsh environment and resistance to diseases. However, most peasants and potential commercial farmers prefer to stock exotic breeds mainly because of their genetic superiority and associated quick capital returns (Balogun, 1981; Ilemobade and Balogun, 1981; Omeke, 1989, 1990). The general observation is that these exotic pigs tend to produce below optimum biological levels in the tropics. In support, Ogunfowora *et al.* (1980) highlighted that most exotic pigs raised in the tropics had suffered inbreeding depression due to mismanagement. Strategies being suggested for developing pig industry in the tropics include establishment of cooperatives and nucleus breeding herds. This justified the establishment of a Federal Government (FG) owned Piggery Breeding and Progeny Testing Centre at Okpuje near Nsukka and demonstration farms in many institutions of higher learning in Nigeria. Management practices relative to fertility of pigs in these "centers of excellence" have not

been properly documented for the benefit of policy makers and potential farmers in particular. The present study was carried out to assess management practices and their effects on fertility of purebred and crossbred gilts reared in FG and UNN breeding farms at Nsukka.

MATERIALS AND METHODS

Animals

Sixty healthy gilts comprising 15 purebred Landrace (LR), Large white (LW), crossbred LW x LR and Large White x Hampshire (LW x HS) respectively were selected from fairly larger stocks in a Federal Government (FG) owned Piggery Breeding and Progeny Testing Centre at Okpuje near Nsukka and in University of Nigeria Nsukka (UNN) demonstration farms (Table 1) and used. They were screened free from haemoprotozoan infection and closely assessed for 4-years (1993 to 1996). Animals were individually stocked at one per pen in fly-proof open ventilated houses and maintained on concentrate the variable sources) at a range rate of 1.8 – 2.5 kg/day, depending on their physiological states. Experimental animals were occasionally dewormed with piperazine adelpate (Pfizers, Nig. Ltd., Lagos). They were checked and treated for trypanosome infection on observation of clinical features of the diseases.

Experimental procedure

The experimental gilts were closely observed for cyclic oestrus. On observation of a third pubertal oestrus, and on subsequent postweaning (6 wks) oestrus, a gilt/sow was mated on two consecutive days to a proven boar. A dam that returned on heat was remated. Thereafter any dam was culled if she failed to conceive, aborted or became anoestrus. At farrowing and weaning, piglets were weighed. Prewaning mortality, disease occurrence and other abnormal-management failures were noted. Fertility was scored from conception rate, to gestation periods,

rebreding intervals, abortion and anoestrus for dams and litter size and weight, growth rate and preweaning mortality for the offspring. Parameters were compared between animal breeds and farm types.

Statistical analysis:

Data were analysed using Statistical Analysis System (SAS Institute Inc., Cary, N.C., 1982). Mean values were compared using repeated measures of analysis of variance (ANOVA) (True Epistat, Epistat Services, Richardson, Texas). Student Newman – Keul's (SNK) test for least significant difference ($P < 0.05$) was used as the post ANOVA test.

RESULTS

All gilts had successful first and second parity breeding except that 2, 3 and 2 of the LR, LW and LW x LR dam groups, respectively conceived after remating for the second parity breeding. Thereafter, there was increasing cases of remating, abortion and anoestrus particularly among purebred group in FG farms. Consequently, 8 (53.3%), 6 (40.0%) 10 (66.7%) and 13 (86.7%) out of 15 dams from the respective breeder groups (LW, LW, LR x LW and LW x HS) attained fifth parity (Table 2) within the study period. Gestation periods were similar and were pooled (Mean = 113.4 ± 0.8 days). Breeding intervals were generally long and ranged between 192 and 268 days. Sows generally tended to loose body condition but none died consequently.

Number of litters and mean litter size at birth of piglets are shown in Table 3. Litter size increased with parity, reaching peak levels at third (Purebreds) and fourth (crossbreds) parities. Total litter numbers were 53, 58, 66 and 70 while mean litter size of 8.5 ± 1.8 , 8.8 ± 1.5 , 9.5 ± 0.9 and 9.7 ± 1.4 ($P < 0.05$) were obtained for the respective group. Purebred offsprings has slightly lower birth and weaning weights than the crossbred counterparts (Table 4). Daily piglet weight gain did not differ significantly. Prewaning mortality rates of 13.1% and 15.7% for LR and LW differed significantly from 8.9% and 10.1% ($P < 0.05$)

EFFECT OF BREED AND ENVIRONMENT ON RABBIT LITTER TRAITS

TABLE 1: NUMBER OF PURE AND CROSSBRED GILTS EVALUATED IN TWO NUCLEUS BREEDING HERDS AT NSUKKA AREA BETWEEN (1993-1996)

Farms	Animal breed/group				Total
	LW	LW	LW x LR	LW x HS	
Govt. Farm, Okpuje	6	6	8	-	20
UNN Farms, Nsukka ¹	9	9	7	15	40
Number/group	15	15	15	15	50

LR = Landrace; LW = Large White; HS = Hampshire

1 = University of Nigeria Nsukka has two farm units pooled for the purposes of this study.

TABLE 2: CASES OF ABORTION, ANOESTRUS AND NUMBER OF PARITIES ATTAINED BY SOME GILTS IN TWO NUCLEUS BREEDING HERDS AT NSUKKA (1993-1996)

Description	Animal		Breed/group	
	LR	LW	LW x LR	LW x HS
No of gilts started with	15	15	15	15
No attaining 3 rd parity (as%) gp)	12(80.0)	11(73.3)	14(93.3)	15(100.0)
No attaining 5 th parity (% of gp)	8(53.3)	8(40.0)	10(66.7)	13(86.7)
No. of conceptions	56	62	67	70
- after remating	12	17	6	7
- No abortions: G	3	3	1	-
: U	-	1	-	-
No. anoestrus : G	2	3	3	Na
: U	2	2	1	2
Total No culled/by 1996 (as % gp)	7(46.7)	9(60.0)	5(30.0)	2(13.3)

G = Govt. Farm

U = University Farms.

TABLE 3: NUMBER OF LITTERS AND MEAN ($\pm$ SEM) LITTER SIZE AT BIRTH BETWEEN FIRST AND FIFTH PARITIES ATTAINED BY BREEDS OF GILTS IN NUCLEUS BREED HERDS AT NSUKKA (1993-1996)

Animal Breed	Parameters	1 st	2 nd	3 rd	4 th	5 th	Total
LR:	No. litters	15	15	9	8	6	53
	Litters size	7.6 $\pm$ 1.4	8.4 $\pm$ 1.2	10.1 $\pm$ 0.9	9.2 $\pm$ 1.1	8.5 $\pm$ 1.8	8.5 $\pm$ 1.8
LW:	No. litters	15	15	10	10	8	58
	Litters size	7.8 $\pm$ 1.3	8.6 $\pm$ 1.4	9.6 $\pm$ 1.3	9.6 $\pm$ 1.3	8.4 $\pm$ 1.2	8.8 $\pm$ 1.6
LW x LR:	No. litter	15	15	14	12	10	66
	Litters size	8.4 $\pm$ 1.1	9.2 $\pm$ 1.3	10.1 $\pm$ 1.2	10.2 $\pm$ 0.8	10.0 $\pm$ 0.9	9.5 $\pm$ 0.9
LW x HS:	No litter	15	15	14	13	13	70
	Litters size	8.2 $\pm$ 1.0	9.6 $\pm$ 1.4	10.4 $\pm$ 1.1	10.2 $\pm$ 0.9	10.1 $\pm$ 0.7	9.7 $\pm$ 1.4

recorded for LW x LR and LW x HS crossbreds.

Losses of piglets were mainly due to weakness, accidents and deficiencies in husbandry. Some 16 (26.7%) sows tested towards the end of the study for protozoan infection (trypanosomiasis) by buffy coat examination (Omeke, 1994) were positive. Considering infrastructural availability, the FG farm was more understocked, underutilized and undermanaged than the UNN farm.

DISCUSSION

Nsukka area is endowed with abundant agricultural resource inputs including low heat environment (26.8°C, 65-80% R.H.) and equal rainy and dry seasons suitable for piglet survival. Besides, majority of the people in the area are indiscriminate consumers of pork. The establishment of FG and institutional breeding herds in the area is justified. These centers however don't perform up to expectations. Low stocking rate, under-utilization of the scarce and precious facilities and poor husbandry practices were evidently noted in the study and could stem from bureaucracy and mismanagement of resources. Efficient management should thrive to maintain a sizeable herd, minimize piglet mortality and produce healthy piglets at weaning. To achieve these objectives, managers of breeding herds should resort to strategic practices considered suitable for the tropical environment (Spaeth, 1970; Maner, 1973). Besides, financial prudence, routine health care including periodic prophylaxis against helminthes and trypanosomes, sprinkling of water, on-farm formulation of feed, standardized low-cost feeding and accurate record keeping are basic management requirements for successful pig productivity. Such were not the case in both farms studied.

Although all gilts had initial successful parities, their genetic values were soon masked by the effects of mismanagement which

resulted in fertility failures. Bureaucratic bottlenecks and other factors that hindered productivity were more evident in the FG farm than in the UNN farm. Strict adherence to bureaucracy obviously delayed necessary financial transactions such as purchase of feed, staff training and welfare. This led to reduced commitment to duty to reduced commitment to duty. Neglect of necessary routine husbandry procedures resulted in reproductive failures (Den-Hartog and Van-Kempen, 1980). Radestits *et al.*, (1994) expressed the same view, emphasizing that in the pig industry, nutrition mainly determines productivity. There is significant interplay between nutrition and reproductive efficiency. Several authors (Topps, 1977; Dyck *et al.*, 1980) emphasized nutritional aspect of livestock production. It may be rightfully concluded that excess or deficient nutrition is detrimental to farm animal fertility. To exceed the peak reproductive ceiling at third parity (Mausolf and Horst, 1986) assumed for exotic breeds in tropical environment, farm managers must be mindful of pig nutrition. The financial implications of low fertility in nucleus herds in the tropics may be disturbing. In well managed profit making herds, 10-22 piglets may be weaned per sow yearly (Tomos and Nielsen, 1982). In the breeding farms at Nsukka, piglets weaned per sow yearly did not exceed 7, taking into account that preweaning mortality rate generally exceed 10% (Table 4). The need for improved management on these farms is therefore emphasized.

Purebred LW showed slightly superior fertility over LR dams. Similar observations were made at Ayangba, a distance of 40 kilometers from Nsukka (Omeke, 1990). Devendra and Fuller (1979) contrarily asserted that LR is more easily acclimatized in the tropics. On the other hand, the Hampshire crossbred group used in the study performed exceptionally better than the LW x LR counterpart. Hampshire breed is not popular in Nigeria farms. The authors however suggested that

EFFECT OF BREED AND ENVIRONMENT ON RABBIT LITTER TRAITS

TABLE 4: MEAN ($\pm$ SEM) PIGLET WEIGHT: DAILY WEIGHT GAIN AND PREWEANING MORTALITY RATE OF OFFSPRING TO GILTS REARED IN TWO NUCLEUS BREEDING HERDS AT NSUKKA (1993–1996)

Animal Breed	Birth wt. (kg)	Weaning (6 wks) wt. (kg)	Daily Wt. Gain (kg)	Mortality rate (%)
LR	1.42 $\pm$ 0.4	6.0 $\pm$ 0.1	0.11	13.1 ^a
LW	1.46 $\pm$ 0.4	6.2 $\pm$ 0.1	0.12	15.7 ^a
LW x LR	1.60 $\pm$ 0.3	6.8 $\pm$ 0.2	0.13	9.8 ^b
LW x HS	1.62 $\pm$ 0.5	7.0 $\pm$ 0.4	0.13	10.1 ^b
All (pooled)	1.5 $\pm$ 0.3	6.4 $\pm$ 0.2	0.12	12.1

ab = $P < 0.05$ Values bearing same superscripts in the same vertical row are not statistically different.

further investigations be carried out in favour of this breed of pig. They are prolific and seem to adapt well to tropical environment.

In conclusion, Governments and institutions involved in breeding pigs in the tropics should minimize bureaucracy and management failures capable of negating productivity. Strategic application of recommended management techniques for exotic pigs in the tropical environment should not be ignored. The Hampshire breed should be investigated further as a breed suitable for tropical environment.

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