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SHORT COMMUNICATION

REPRODUCTIVE PERFORMANCE OF MARKADUKE IN DIFFERENT PARITIES

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ABSTRACT

A total of 70 litter data from 10 Markaduke sows from 2015-2021 records were used considering the completeness of the records to present the effect of parity on Markaduke sows' reproductive performance. The records include the total litter size (TLS), litter size born alive (LSBA), litter size weaned (LSW) average weight at weaning (AWW) and average weight at birth (AWPB). Data were evaluated using descriptive statistics and Pearson correlation. The study revealed that the number of TLS and LSBA was highest in 3rd (10.10 and 9.90) and 4th (9.90 and 9.30) parity. Also, the 3rd parity had the largest litter size at birth (10.10) and at weaning (8.90). An increase in TLS, LSBA and LSW was observed at 3rd and 4th parity and gradually decreases as parity number increases. It was concluded that the notable reproductive performance of Markaduke sow may be achieved at 3rd and 4th parity.

Keywords: weight, litter, Markaduke, parity, sow

The reproductive performance of the sow is a major factor that controls the efficiency of swine production (Yilma, 2017). The litter size born alive (LSBA) and litter size weaned (LSW), as well as the average weight at birth (AWPB) and average weight at weaning (AWW), are among the most economically important traits in pig production (Nowak *et al*., 2020). The Markaduke pig (Trademark Application No. 42021505662) is a product of a close nucleus breeding system employing selection for growth and litter size under assortative mating. The improved breed was achieved through the selection of breeders based on their phenotypic characterization. Native pigs in Marinduque, Philippines are used as foundation stock because they are known to be the best source of lechon (Urlanda, 2019). The nucleus center's goal is to make the Markaduke pig a superior breed with the finest genetics for prolificacy, growth, and meat quality through research and development.

There is limited information on the effect of parity on the performance of the Markaduke sow, hence the objective of the study is to determine the reproductive performance of Markaduke sow in different parities. The significance of this study is that it will serve as a reference in monitoring and evaluating reproductive performance in the nucleus farm and will serve as the basis for developing culling policy as well as baseline data for future

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endeavors.

The animal performance records were retrieved from the database of Markaduke Research and Development Center, Marinduque State College, Poctoy, Torrijos, Marinduque. Records from ten Markaduke sows with complete data on seven parities from 2015 to 2021 were evaluated. Records on total litter size (TLS), litter size born alive (LSBA), litter size weaned (LSW), average weight of piglets at birth (AWPB), and average weaning weight of piglets (AWW) were evaluated using descriptive statistics and Pearson correlation.

Table 1 presents the summary of descriptive statistics of reproductive performance of Markaduke sow at different parities considering economically important traits. The age of the sow was computed by subtracting the sows' date of birth by the date at first farrow and subsequent parities. This paper defines TLS as all piglets born in a litter per farrowing. The discussion by Kemp *et al*. (2018), says that sow litter size has been steadily increasing as a result of selection for larger litters. The LSBA is defined as the total number of piglets born alive in each farrowing (excluding stillborn and mummified pigs). A study conducted on two Mexican Native Pig breeds namely Mexican Hairless Pig (MHP) and Cuino Pigs (CP), reported born alive piglet/litter of 6.04 and 5.36 heads (Lemus *et al*., 2003), respectively, compared to the average litter size born alive of Markaduke sow at first parity. This study's TLS was greater than the findings of Bondoc *et al*. (2017) who presented that for Black Tiaong sows TLS was 5.71±0.19 heads and Kalinga sows 5.11 ± 0.41 heads. The LSW refers to the number of piglets weaned per litter farrowed. The findings of this study agree with the results of study that the data obtained for average TLS (13.2) and the average LSW (10.2) by Hagan and Etim (2019). The results are also comparable to records of 10.2 and 8.0 for TLS and LSW, respectively (MOFA, 2012 as cited in Hagan and Etim, 2009), and 11.0–14.5 recorded in temperate locations by Knecht *et al*. (2015), Quesnel *et al*. (2008) and Huang *et al*. (2003). The AWPB is defined in this study as the average of the summation of individual piglet weight at birth of litter in one farrowing. The findings on litter birth weight were heavier than in Black Tiaong (0.82 ± 0.01 kg) and in Kalinga (0.56 ± 0.2 kg) (Bondoc *et al*., 2017). According to Leenhouwers *et al*. (2001), one of the most critical variables impacting pig survival is their birth weight. Piglet survival after delivery can also be influenced by litter size, as piglet losses are higher in bigger litters, which could be due to within-litter heterogeneity in the body weight of piglets (Marchant *et al*., 2000; Lay *et al*., 2002). However, birth weight is one of the most important factors influencing colostrum intake, piglet growth, welfare, and survival (Wiegert and Knauer, 2017). This agrees with Ajayi and Akinokun (2013) findings where the mean weight at birth was 0.93 ± 0.02 kg and the mean weight at weaning was 4.03 ± 0.55 kg, respectively. Both results were better than the average pig weight of the Black Tiaong (3.800.07 kg) and Kalinga (3.560.22 kg) breeds at 30 days (Bondoc *et al*., 2017). On the other hand, results of study in Northern Province of Laos on the indigenous Lao pigs reared by small farmers were relatively higher with an average weight of 7.30 ± 2.12 kg with a suckling period of approximately 2.62 ± 0.79 months (Xayalath *et al*., 2021).

Table 2 shows the positive correlation among the Markaduke litter performance parameters at $P<0.01$. The TLS has a perfect positive relationship with LSBA with a value of 0.96 and was moderately correlated with AWW at 0.60. Further, it was found out that LSW and AWB were fairly strong positively correlated with TLS at 0.81 and LSB with a value of 0.84. Also, the result presents a fairly strong relationship between the LSW and AWW at 0.81. Furthermore, AWB was moderately correlated with LSW with a value of 0.76 whereas

Table 1. Descriptive statistic of reproductive performance of Markaduke sow at different parities.

Parameters (n=10)	Parity						
	1	2	3	4	5	6	7
Age (days)							
Mean	403.10	636.00	867.10	1052.40	1287.60	1489.50	1706.30
Sd	65.60	80.10	127.59	124.15	154.12	162.46	130.30
Min	312.00	509.00	678.00	877.00	1061.00	1255.00	1509.00
Max	530.00	744.00	1104.00	1273.00	1460.00	1733.00	1945.00
CV	16.25	12.59	14.72	11.80	11.97	10.91	7.64
TLS (hd)							
Mean	6.50	8.00	10.10	9.90	9.00	8.50	8.60
Sd	2.76	3.68	2.85	2.81	2.49	3.34	3.53
Min	2.00	4.00	5.00	5.00	5.00	1.00	5.00
Max	10.00	15.00	14.00	14.00	13.00	13.00	17.00
CV	42.44	46.02	28.18	28.35	27.72	39.31	41.09
LSBA (hd)							
Mean	6.40	7.60	9.90	9.30	9.00	8.30	7.80
Sd	2.63	3.44	2.85	2.58	2.49	3.09	4.18
Min	2.00	4.00	5.00	5.00	5.00	1.00	1.00
Max	10.00	15.00	14.00	14.00	13.00	11.00	17.00
CV	41.14	45.24	28.75	27.79	27.72	37.27	53.65
LSW (hd)							
Mean	3.50	6.40	8.90	8.10	8.40	6.90	7.10
Sd	2.92	3.47	2.69	1.52	2.84	3.14	3.57
Min	0	1.00	5.00	5.00	3.00	0	1.00
Max	9.00	12.00	13.00	10.00	13.00	11.00	15.00
CV	83.30	54.23	30.17	18.81	33.77	45.55	50.32
AWPB (kg)							
Mean	4.48	5.77	7.34	6.52	7.35	6.92	7.17
Sd	2.18	2.69	2.44	1.73	2.41	2.98	3.25
Min	0.80	2.66	3.06	4.62	3.60	0.60	0.57
Max	7.38	11.45	10.52	9.58	11.11	12.10	11.28
CV	48.54	46.64	33.20	26.49	32.86	43.14	45.26

Table 1. Continuation....

Parameters (n=10)	Parity						
	1	2	3	4	5	6	7
AWW (kg)							
Mean	13.53	24.76	38.45	34.04	32.50	27.22	28.21
Sd	11.52	11.73	17.59	10.20	10.14	13.03	12.68
Min	0	3.80	18.08	17.10	10.80	0	8.20
Max	37.46	42.22	76.20	50.76	48.80	44.80	58.73
CV	85.17	47.39	45.74	29.96	31.20	47.88	44.93

TLS - total litter size; LSBA - litter size born alive; LSW - litter size weaned; AWPB - average weight of piglets at birth; AWW - average weaning weight of piglets

Table 2. Pearson Correlation Coefficients Markaduke litter performance.

	TLS	LSBA	LSW	AWB	AWW
TLS	1.00				
LSBA	0.96**	1.00			
LSW	0.81**	0.84**	1.00		
AWPB	0.81**	0.84**	0.76**	1.00	
AWW	0.60**	0.64**	0.81**	0.62**	1.00

**Significant at $P<0.01$

TLS - total litter size; LSBA - litter size born alive; LSW - litter size weaned; AWPB - average weight of piglets at birth; AWW - average weaning weight of piglets

AWB is moderately correlated with LSW at 0.76 and AWW has a moderate relationship with LSB and AWB at 0.64, 0.62, respectively. Pearson's correlations of number born alive (NBA) with litter birth weight (LWB) (0.92) were highly positive, according to Ogawa and Satoh (2020). Furthermore, the estimated genetic correlation between NBA and LWB was significant (0.95). As a result, LWB may represent a promising for effectively improving NBA. Some variables that were measured at the same time as NBA, such as total litter birth weight (LWB), had higher heritabilities and significant genetic connections with NBA (Ogawa *et al*., 2019; Hermesch *et al*., 2000; Damgaard *et al*., 2003).

This economically important reproductive trait would work in a nucleus farm if proper husbandry is implemented and monitored. With this indicator, we can conclude that the performance of the sow was enhanced through the management of newly farrowed litter in terms of providing assistance to the sow at parturition, introducing baby pig management, following selection criteria for replacement gilts, monitoring and evaluating sow performance and has genetic improvement over the years.

Due to the economic importance of weaned pigs, sustained proper management is required for improved litter size born alive, litter weaned and low mortality rate. Such native pig husbandry management practices may commence from the selection of native pigs for breeding, taking into account the bases of selection for boar and replacement gilts and ending with a culling program. In terms of reproduction, it is significant to consider the

breeding age, monitor the estrous cycle, implement and practice techniques in heat detection and provide intensive care during the gestation period. Most importantly, nutrition and feeding requirement must be satisfied.

It is recommended to closely monitor the sow herd to maximize the reproductive potential from the continuous genetic selection of sows with high prolificacy to consider factors associated with the reproductive performance of sows and predict their lifetime performance.

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