

REPRODUCTIVE ASPECTS IN PRIMIPARAE AND SECONDIPARAE SOWS IN RIO VERDE - GOIÁS

ASPECTOS REPRODUTIVOS DE FÊMEAS SUÍNAS PRÍMIPARAS E SECUNDÍPARAS EM RIO VERDE - GOIÁS

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SUMMARY

The objective of the study was to follow 2,514 parturitions in primiparae (parturition order one) and secondiparae (parturition order two) sows to evaluate the total piglets born, piglets born alive, stillbirths and mummified fetuses. The parturitions were put together in two periods of the year named: hot season (1st and 4th quarters) and mild season (2nd and 3rd quarters). The 28,617 piglets born, the primiparae sows showed 4.7% of stillbirths and 2.9% of mummified fetuses and the secondiparae sows showed 5.0% of stillbirths and 2.5% of mummified fetuses. The percentage of stillbirths and mummified fetuses were higher in the hot season comparing with the mild season, for both parturition order sows. The highest stillbirth rate was 6.2% and 7.4% for primiparae and secondiparae sows respectively. The highest average of total piglets born also occurred in the hot season (4th quarter) 12.35 piglets /litter for the primiparae sows and 11.38 piglets/litter for the secondiparae.

KEY-WORDS: *Piglet. Mummified fetuses. Stillbirths.*

RESUMO

Foram acompanhados 2.514 partos de fêmeas suínas de ordem de parto um e dois para avaliar as taxas de leitões nascidos totais, vivos, natimortos e mumificados. Foram agrupadas as partições em dois períodos denominados, quente (1º e 4º trimestres) e ameno (2º e 3º trimestres). Dos 28.617 leitões nascidos, a ordem de parto um apresentou 4,7% natimortos e 2,9% mumificados, e a ordem de parto dois teve uma ocorrência de 5% de natimortos e 2,5% de mumificados. O percentual de natimortos e mumificados foi maior no período quente, nas duas ordens de partição. A maior taxa de natimortalidade foi 6,2% e 7,4% nas duas ordens de partição respectivamente. As maiores médias de leitões totais nascidos também ocorreram no período quente (4º trimestre) 12,35 leitões/leitegada na ordem de parto um e 11,38 leitões/leitegada na ordem de parto dois.

PALAVRAS-CHAVE: Leitão. Mumificados. Natimortos.

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INTRODUCTION

In the last decade, great changes in the spatial order of pig farms in Brazil have been observed. Large agribusiness in the domestic market typically installed in the South, have expanded their activities by opening new production facilities in the Midwest region.

Profit margins of pig farms have been decreasing, and this is the determining factor for a series of transformations that are already occurring in both the structure of production and the expansion of the activity outside the Southern states (PINHEIRO MACHADO. 2001).

The Southwest region of Goiás is an extensive micro-region, with a total area of 2.74 million hectares (16% of the total state area), and 18 municipalities (BRUM & WEDEKIN. 2002). The plain terrain and the strategic location, among other factors, are transforming the region during the last years in a new and promising agribusiness frontier.

Brum & Wedekin (2002), cited some reasons for the choice of Goiás, and the city of Rio Verde to implement agribusiness projects, including: great availability of soybeans and corn, lack of major competitors in poultry and pig processing industry, favorable soil, topography and climate, with average temperature 21-22°C, low temperature gradient and a central location as well. These factors represent a great advantage for producing and distributing the final product.

Therefore, the establishment of a new cycle of swine production in a region with different characteristics from the South, requires close examination of production indicators. Muirhead & Alexander, cited by Schneider et al. (2001c), stated that in swine production systems, the correct interpretation of production indexes constitutes the first aspect to be considered during a technical visit to a farm. Therefore, data collection and analysis of production rates are important components, necessary to develop appropriate management strategies.

Since farrow is the most important event in swine production, the objective of the study was to determine reproductive parameters of sows in one and two parturition order (PO), to evaluate the total piglets born, piglets born alive, stillbirths and mummified fetuses.

MATERIAL AND METHODS

The data used in the study were collected from a commercial swine farm with 2,500 sows, located in Rio Verde – GO, from January to December, 2008. A total of 2,514 parturitions from primiparae (parturition order 1 - PO1) and secondiparae (PO2) sows were evaluated. Regardless day and time the farrows occurred, the number of total piglets (TP), piglets born alive (LP), stillbirth (SB) and mummified fetuses (MUM) were recorded and the data were further launched into a management program. The data were obtained using the specific program PigCHAMP®, duly licensed.

Meteorological data were supplied by the Meteorological Station located at an altitude of 774.62 m, 50°55' W and 17°48' S, inside Universidade de Rio Verde campus. Farrowings were grouped in two periods named: hot season (1st and 4th quarters) and mild season (2th and 3th quarters) (COSTA et al. 2005; BENTO. 2003).

The sows were grouped according to the number of total piglets born (TP) per litter, in parturition-one or two, as follows: classes A (1-7 piglets), B (8-10 piglets), C (11-13 piglets) and D (14-21 piglets) according to Amaral Filha et al. (2005) and Schenkel et al. (2005). The program GENES (CRUZ. 2001) was used to classify the sows according to the appropriate class. Means, standard deviation and Student "t" Test used to compare the means for total number of piglets (TP) and live piglets during each trimester were also generated by the program GENES.

The crossbred Camborough 22[®] (C22) and Camborough 23[®] (C23) sows were brought in the farm at 150 days of age, weighing about 90 kg. The sows had the first estrus after a week, but they mated only after the third or fourth estrus, after 210 days, when the mean weight was 130 kg. In the maternity, the sows were housed in individual pens with plastic or metal floor, equipped with watering and feeding troughs, and the creep feeders used by the piglets. The ambient was controlled with curtains on both sides, the use of sprinklers on the roof, and two large fans per room. Room capacity varied between 16 and 28 pens, for the old and new rooms, respectively. During pregnancy, the ambient was also controlled with curtains, fans and sprinklers inside the warehouses.

Five days after the sows arrived in the farm, they were vaccinated with a single dose against *Mycoplasma hyopneumoniae*¹ and also against *Actinobacillus parapleuropneumoniae*, *Haemophilus parasuis* and *Pasteurella multocida* D², which was repeated after 10 days. On the 190th day, they were vaccinated against *Erysipela rhusiopathiae*, porcine Parvovirus infection and *Leptospira spp*³ (Triple), with a second dose after 15 days, and new doses 6 and 9 days after each farrowing.

On the 80th day of gestation, they were vaccinated against *Bordetella bronchiseptica* and *Pasteurella multocida* D⁴ (atrophic Rhinitis), which was repeated after 100 days. This vaccine was also given to the pluriparae on the 100th day of gestation. On the 80 and 100th day of gestation, they were vaccinated against *Escherichia coli*, *Clostridium perfringens* type C and *C. novyi* type B⁵, which was repeated in the pluriparae on the 100th day of gestation.

Farrowing was induced two days before the due date, about 112 days of gestation, in order to monitor farrowings during day time, and to diminish night and weekend farrowings. An insulin needle (0.45 x 13) was

¹ RespiSure one – Pfizer

² Autogena - Microvet

³ Farrowsure B - Pfizer

⁴ Arradicator - Pfizer

⁵ Litter guard LT - Pfizer

used to inject 0.5 ml of cloprostenol via sub-vulvar mucosa.

The piglets received primary care at birth. They were wiped with paper towel or covered with a drying powder⁶, umbilical cord was cut and disinfected, and the first feeds were directed towards colostrum ingestion. The piglets born during evening and night were identified and had the teeth clipped in the morning, while the ones born in the morning had the procedure done in the afternoon.

RESULTS AND DISCUSSION

From the total of 28,617 piglets born in the farm, PO 1 was responsible for 24.4% and PO2 for 19.8% of the total births in the pig farm in the studied year, as shown in Table 1. The result for PO1 is different from the result reported by Wentz & Bortolozzo (2000), who stated that replacement sows are very important since they represent about 10 to 20% in each parturition order group.

The lowest and highest temperatures were 14.0 and 32.9°C in July and September, respectively. Although it was included in the mild trimester, September temperatures were high during the year of 2008, as shown in Figure 1.

As for the size of the litter, PO1 had average total piglets born/litter (TP/L) higher than PO2 in both periods, thus the number of live piglets born/litter (LP) was also higher compared to PO2, according to results shown in Table 2. This result is different than what was reported by Martins et al. (2005), who reported lower number of total and live born piglets to parturition-one sows compared to higher order sows. However, it is in agreement with Schenkel et al. (2007) that reported lower number of piglets born to second order parturition sows in several pig farms, and Bertolozzo et al. (2005) who state that in Brazilian farms in general, parturition-one sows have better performance compared to parturition-two sows. This finding characterizes the so called second farrowing syndrome in this farm.

The total number of piglets born (TP) was higher during the hot period, for both PO1 and PO2 (4th trimester) as seen in Tables 2, 3 and 4. These results were expected since insemination was performed during the mild period, and corroborate the results reported by Costa et al. (2005), who reported that high temperatures increased embryo mortality rates, mainly during the first month.

Figure 2 shows that during September, PO1 had mean TP/L (12.3) equal to the means from the last trimester of the year, months in which mean and maximum temperatures were similar.

The number of live piglets born to PO1 sows varied from 10.2 to 11.5 according to Figure 2, and it was higher than the 10.18 recommended by Crestani (1995) and within the target of 10 to 12 piglets suggested by Barcelos et al. (2002). The yearly mean of 10.9 piglets/litter observed for PO1 is shown in Table 1, and it was slightly higher than the 10.56 reported for the

same order sows by Bento (2003), in the Southwest region of Goias.

The results presented in Figure 3 for PO2 sows, show a variation from 8.8 to 11.3 live born/litter, and during March, June, August and September the number of piglets was lower than that recommended for an optimized swine culture according to Crestani (1995), Barcelos et al. (2002) and Sesti & Sobestiansky (1998). The yearly average of 10 piglets/litter, presented in Table 1 for PO2 sows is lower when compared to results presented by Bento (2003) for a similar study in the same region.

The distribution of sows according to litter class size is shown in Table 5. They show high percentage of sows (39.3%) in Class C, where first litter had from 11 to 13 piglets. For PO2, there was also high number of sows in Class C (34.4%), although migration to Classes A (18.3%) and B (23.8%) could be observed as well as decreasing number of sows in Class D (23.5%). These behavior lead to decreasing number of piglets born to parturition-two sows compared to parturition-one, as shown in Table 2, which reinforces the characteristics of second farrowing syndrome. These results are in agreement with the ones reported by Amaral Filha et al. (2005) where first litter distributed the sows in classes A (7.9%), B (20.8%), C (46.3%) and D (25.0%) and second litter in classes A (14.6%), B (29.5%), C (37.5%) and D (18.4%).

Stillbirth rates to parturition order one and two sows are presented in Figure 4. During the hot period, mean SB rates for PO1 and PO2 were 4.9 and 5.4%, and higher compared to the mild period 4.2 and 4.4%, respectively. The same was observed for PO2 sows 5.3 and 5.7%, during the hot period compared to 4.2 and 4.8%, in the mild period. These results were already expected, because according to Wentz et al. (2006) the stress caused by both the heat during the final phase of gestation and transportation of sows to the maternity during farrowing may cause problems to fetuses, thus increasing stillbirth rates. Barcelos et al. (2002) also reported that high temperatures after 100 days of gestation may increase the percentage of stillborn. The results also showed that PO2 sows had higher rates compared to PO1 during the same period.

Monthly stillbirth rates (SB) are shown in Figure 5; PO1 varied from 3.7% in June to 6.2% in December, and yearly rate of 4.7%. On the other hand, the results for PO2 varied from 3.9 % in April to 7.4% in November, and yearly rate of 5%. These yearly rates (4.7 and 5%) are within the range acceptable for a modern swine culture, which varies from 5 to 7% according to Schneider et al. (2001a). However, Pinheiro Machado & Dallanora (2007) recommend that stillbirth rates should not be above 3.5% and do not recommend having targets for stillbirth and mummified fetuses, since these numbers can be easily manipulated under pressure.

Wentz et al. (2006), when citing studies based on necropsy, affirmed that approximately 10% of stillborn fetuses die during pre-farrowing, 75% intra-farrowing and 15% soon after birth (AB).

⁶ RS Dry, Fertirico, Curitiba - PR

Table 1. Variables rates of farrowing for PO1 and PO2 sows

	PARTURITION ORDER	
	01	02
Total farrowing (unit)	1,389	1,125
Farrowing group (%)	24.4	19.8
Farrowing rates (%)	88.3	82.4
Total born piglets/ Litter (unit)	11.8	10.9
Live born piglets/ Litter (unit)	10.9	10.0
Stillbirth / Litter (unit)	0.6	0.5
Stillbirth rate (%)	4.7	5.0
Mummified fetus / Litter (unit)	0.3	0.3
Mummified rate (%)	2.9	2.5

Table 2. Means and standard deviations of total piglets (TP) and live piglets (LP) per litter (L) according to hot and mild periods.

	1° Trim (hot)		2° Trim (mild)		3° Trim (mild)		4° Trim (hot)	
	OP1	OP2	OP1	OP2	OP1	OP2	OP1	OP2
TP/L	11.60 ±3.44	10.62 ±3.65	11.25 ±3.26	10.44 ±3.55	11.99 ±3.02	10.94 ±3.58	12.35 ±3.0	11.38 ±3.51
LP/L	10.65 ±3.32	9.79 ±3.42	10.46 ±3.29	9.75 ±3.36	11.18 ±3.08	10.18 ±3.61	11.32 ±3.16	10.43 ±3.31

Table 3. Significance of the contrasts total piglets (TP) and live piglets (LP) per litter for PO1

Parturition order 1	TP / L	LP/L
1° / 2° Trimester	ns	ns
1° / 3° Trimester	ns	*
1° / 4° Trimester	*	*
2° / 3° Trimester	*	*
2° / 4° Trimester	*	*
3° / 4° Trimester	ns	ns

* Significant at 5% by Student' t test

ns – not significant

Table 4. Significance of the contrasts total piglets (TP) and live piglets (LP) per litter for PO2

Parturition order 2	TP / L	LP/L
1° / 2° Trimesters	ns	ns
1° / 3° Trimesters	ns	ns
1° / 4° Trimesters	*	*
2° / 3° Trimesters	ns	ns
2° / 4° Trimesters	*	*
3° / 4° Trimesters	ns	ns

* Significant at 5% by Student' t test
ns – not significant

Table 5. Distribution frequency of 2.514 sows according litter class size

Parturition Order	Litter class size			
	A (1 – 7 piglets)	B (8 –10 piglets)	C (11 –13 piglets)	D (14 –21 piglets)
1	10.1%	19.8%	39.3%	30.8%
2	18.3 %	23.8 %	34.4 %	23.5 %

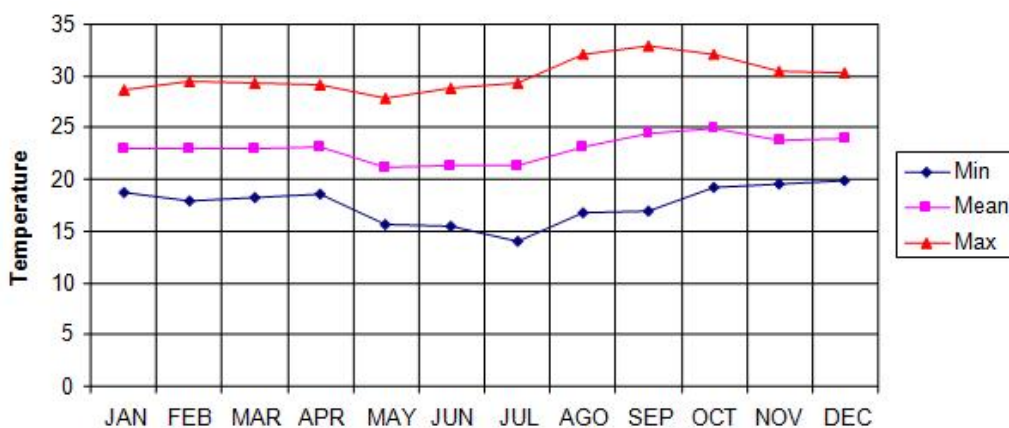


Figure 1. Minimum, maximum and mean temperature variation recordings during 2008 in Rio Verde – GO.

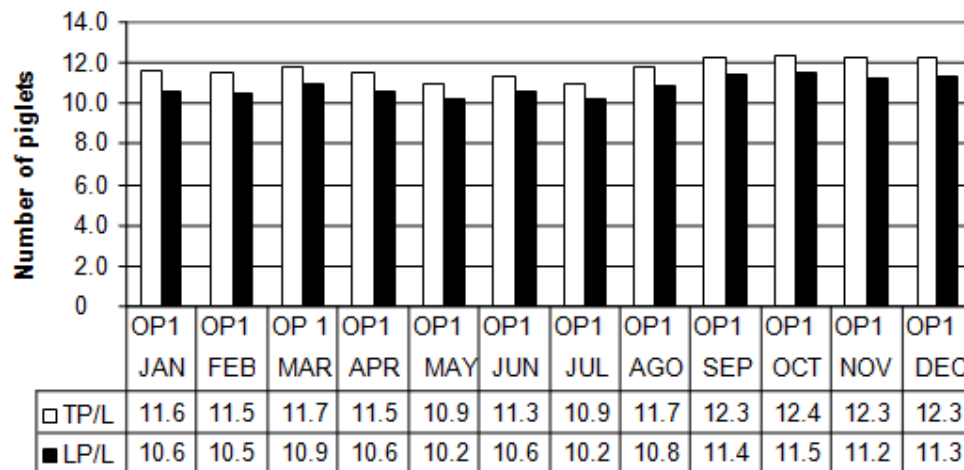


Figure 2. Monthly averages of total (TP) and live piglets (LP) born per litter (L) to PO1 sows during 2008

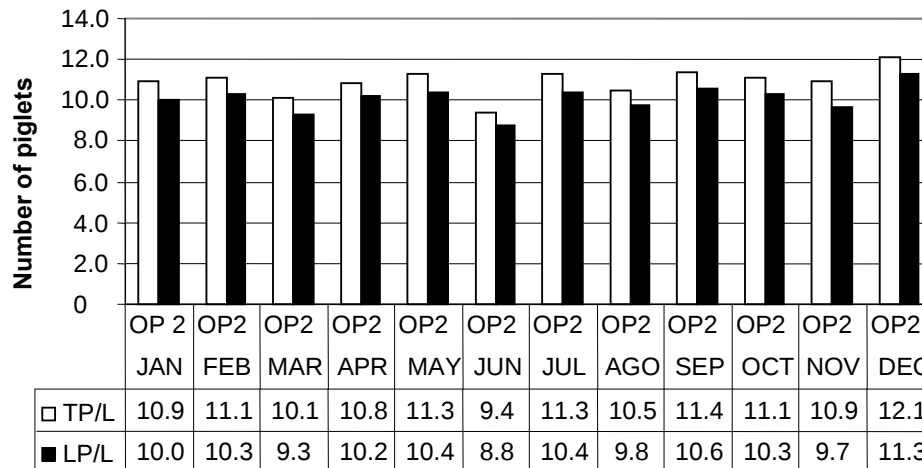


Figure 3. Monthly Monthly averages of total (TP) and live piglets (LP) born per litter (L) to PO2 sows during 2008

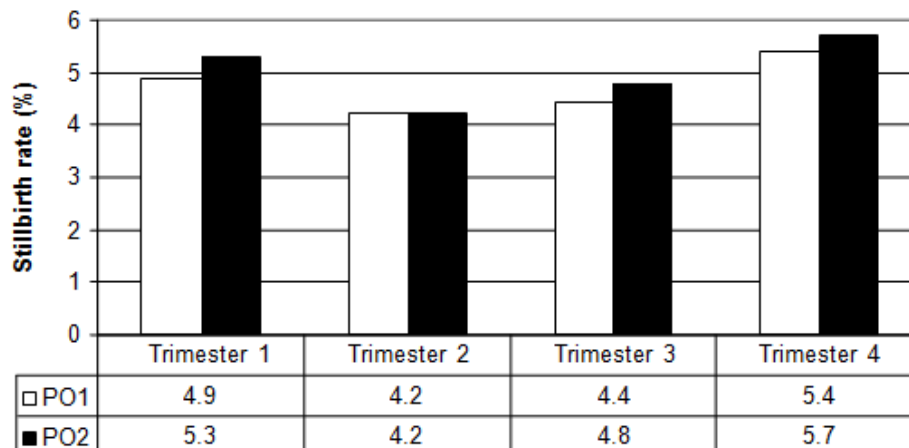


Figure 4. Stillbirth rates for PO1 and PO2 sows per trimester

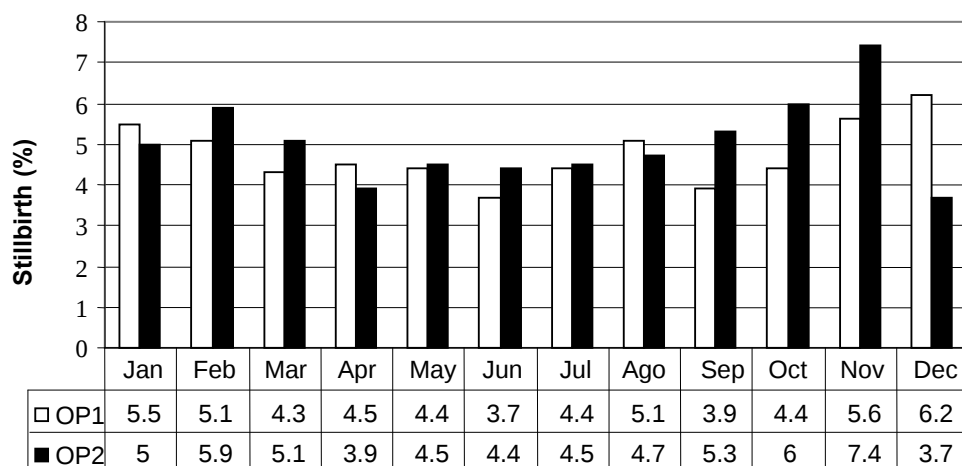


Figure 5. Monthly stillbirth rates for PO1 and PO2 sows

According to these data, for PO1 sows (1.389) the rate of 0.56 SB/L corresponds to approximately 777 piglets, where 75%, that is, 582 were stillborn fetuses from intra-farrowing. Assuming that they would be commercialized with mean weight of 23.5 kg live weight at the price of R\$ 3.2806/kg, the gross income would be R\$ 44.868.76. If from this value the estimated variable costs (ration, medicines, vaccines) of R\$ 25.00/piglet are deducted, the net income for the producer would be R\$ 30,318.76. The producer did not realize this gain due to non-commercialization of intra-farrowing stillborn piglets.

In the same line of thinking for PO2, the producer did not realize a gain of R\$ 23.070.81, totaling R\$ 53.389.62 for both PO1 and PO2.

As for mummified fetuses (Figure 7), during the mild period (trimesters 2 and 3) the rates were higher for both PO1 (2.7 and 2.5%) and PO2 (2.2 and 2.6%) compared to the hot periods (trimesters 1 and 4) where the rates were for PO1 (3.1 and 2.8%) and PO2 (2.8 and 2.7%), respectively. Wentz et al. (2006) affirmed

that high temperatures in the installations during sow pregnancy are risk factors that increase the rate of mummified fetuses. However, Bento (2003) did not observe a significant effect of temperature on the rate of mummified fetus/litter, and reported 0.27 for the hot period (October/March) and 0.26 for the mild period (April/September).

The rate of mummified fetuses for PO1 (Figure 6) varied between 2% (May and July) and 3.6% (February), with yearly average of 2.9%. For PO2 the rates varied between 1.8% in April to 3.2% in November, and yearly average of 2.5%. Therefore, mummified rates for PO1 were higher compared to PO2, a result that corroborates the ones reported by Schneider et al. (2003), who stated that under endemic conditions, especially primiparae females, may present higher rates of mummified fetus compared to females of parturition order two or higher. This is due, at least partially, to low immunological status of PO1 sows, which have not yet been exposed long enough to the endemic pathogens present in the herd.

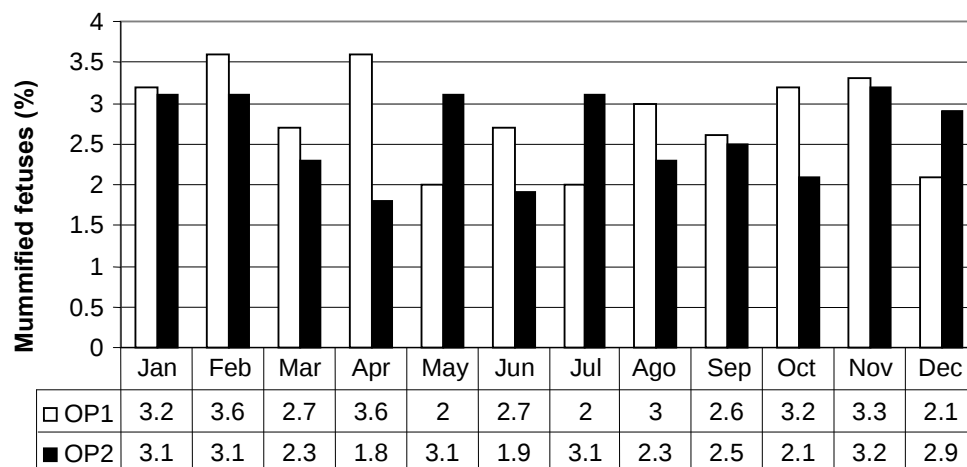


Figure 6. Monthly rate of mummified fetuses (%) for PO1 and PO2 sows.

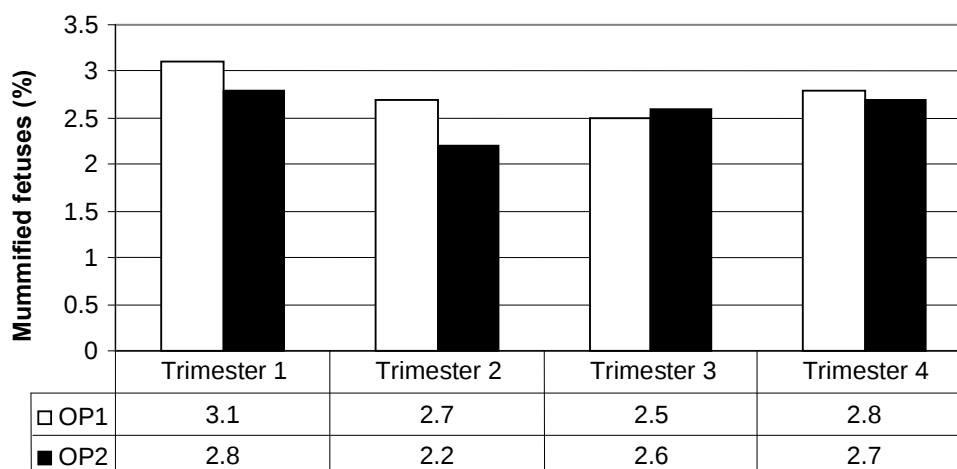


Figure 7. Mummified fetus rate (%) for PO1 and PO2 sows per trimester.

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