PREGNANCY DIAGNOSIS IN PIGS. I. ULTRASONIC METHOD (AMPLITUDE-DEPTH ANALYSIS)

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One of the main problems pig breeders have today in Chile is finding a method to diagnose pregnancy which will give fast, precocious and accurate results, so as to minimize the cost of this operation.

Ultrasonic waves have been widely used as a routine method to diagnose a series of pathologies in man due to their physical properties, safety and high efficiency (Davey and Wells, 1978). In the pork industry they have been used to measure the live back-fat thickness and loin area (Royal and Tainturier, 1976). As a method of pregnancy diagnosis, ultrasonic waves can be used in two ways: through the Doppler effect, which defects moving objects (fetal and / or uterine circulation and fetal movements) and through the Amplitude-Depth or Echo Analysis that determines the presence of liquids in the womb matrix, as these provide a difference in acustical impedance between contents in gravid uterus and adjacent tissues. (Lindahl et al., 1975).

This study evaluates the efficiency of the ultrasonic method (Amplitude-depth analysis) in pregnancy diagnosis using and ultrasonic analyzer with a 2 MH_z transducer; this has a system of lights and sound which indicate the reproductive state (pregnant or dry) of the female, inmediately and in an easily interpretable way. The transductor, previously lubricated with a low viscocity oil, was applied on both flanks of the standing animal and directed diagonally in a 45° angle towards the insertion of the last rib of the opposite side.

A total of 1.276 diagnoses were made on days 21, 28, 35, 42, 49 and 56 post breeding on the females which had not shown signs of heat by the day of the exam. The results were compared with number farrowing, abortions and heat detected after diagnosis. The indicators used were: Total Accuracy (T.A.) (%) = number of correct diagnoses/number of total diagnoses; Accuracy for pregnancy (A.P.) (%) = number of correct pregnancy diagnoses/number of total pregnant diagnoses and Accuracy for non-pregnancy (A.N.P.) (%) = number of correct non-pregnant diagnoses/number of total non-pregnancy diagnoses. The females were classified in theee groups; gilts, sows of 2 and 3 farrowings an sows of 4 to 7 farrowings (groups 1, 2 and 3 respectively).

Of the total diagnoses made, 1140 were positive for pregnancy (89.3%) and only 136 for non-pregnancy (10,7%), as this study was done on a farm with a high reproductive efficiency.

The T.A. at 21 days was 48.4%, lower than that obtained at 28, 35, 42 and 49 days (93.2, 95.2, 96.8 and 96.6% respectively). The highest accuracy ($p \leq 0.05$) was obtained at 56 days with 99.6%.

The A.P. follows the same pattern and was 87% at 21 days, less ($p < 0.05$) than that obtained at 28, 35, 42, 49 and 56 days, which was 96.6, 97.5, 98.1, 97.4 and 99.6% respectively.

These results show that the T.A. and A.P. increased between 21 and 56 days post breeding, and agree with those obtained by O' Reilly (1976) whose best results were between 31 and 90 days of pregnancy. This can be explained by studying the development of the uterine content in the pregnat sow, in which, a greater amount of liquids can be found between days 30 and 90 of pregnancy (Berthelsen and Stevermer, 1973). As from day 25 there is sufficient liquid matter in the uterine tract to be detected by the analyzer (Dziuk, 1974).

The values of A.N.P. obtained don't show any definite tendency due to a great variability of the results due probably to a low number of observations, as, whilst the post breeding period increases there is a greater probability of the dry females coming on heat. In general, the results for A.N.P. were lower than for A.P. and the extreme values were 10,6% at 21 days and 100% efficiency at 56 days.

During the whole period (21-56 days post breeding) the values were of 89.4, 97.8 and 25.7% for T.A., A.P. and A.N.P. respectively.

On classifying the females according to the number of farrowings, it was observed that the shown tendency persists, this is that T.A. and A.P. increase as the days post breeding increase.

Taking into consideration the total period, the T.A. according to the ordinal number of farrowings was 84.6^a, 87.2^a and 93.0^b ($p < 0.05$) for groups 1, 2 and 3 respectively. The A.P. was 93.1^a, 97.2^b and 98.4^b% respectively ($p < 0.05$). This situation can be explained by the different uterine development observed by Pomeroy (1960) in gilts and sows, making the technique more accurate in the latter.

The values for T.N.P. were erratic in the three groups due to the classification which gave a very low number of observations per group.

In conclusion, the technique is useful as from day 28 of pregnancy (93 % T.A.), and its accuracy increases up till 56 days post breeding, although it loses precociousness. Results are more accurate in females with than one farrowing than in gilts.

Selected references:

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