ULTRASONOGRAPHIC COUNTING OF SWINE EMBRYOS

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Detection of large litters and the progession of normal gestation may improve economic efficiency in pig farms. This implies early detection of the number of viable fetuses. Despite great technical improvement in echography, literature on this topic is scarce, with no practical conclusions. The objective of the present study was to assess the accuracy of *in vivo* embryo counting using 2 different devices at 2 different stages of pregnancy.

The trial involved 5 groups of six Large White cyclic gilts from the INRA-PRC herd (Nouzilly, France). They were synchronized with Regumate® (Janssen, France) and artificially inseminated twice, 6 to 12 hours after the onset of estrus and 24 hours later. During ultrasonographic examinations of the embryos, gilts were restrained in a crate and received small amounts of feed to reduce agitation. Scannings were performed by trained operators at two stages (23-25 and 26-28 days after insemination), using successively two different devices (ESAOTE TECHNOS and ALOKA SSD-900, with 5MHz convex transducers) providing different picture qualities. The probe was located on the abdominal flank and was moved slowly and linearly from the back to the front, between the bladder and the ribs. Embryos were counted on the right and on the left sides. After the second control, gilts were slaughtered in the INRA-PRC slaughterhouse and their genital tracts were collected immediately to record living, dead and resorbed embryos (empty allantoic sacs) in both uterine horns. Ultrasonographic (US) embryo counts were compared to true embryo numbers at slaughter, using either raw values or accuracy ratios (US counts / true counts in %). Correlations were calculated and variance analyses for repeated measurements were performed using device, pregnancy stage, replicates and interactions as main factors. Data were recorded for 29 pregnant gilts (1 empty). At 27 days, the average number of living embryos was 17.3 ± 3.2 (10 to 25). Total numbers were respectively 17.5 ± 3.2 and 17.8 ± 3.1 when dead and dead + resorbed embryos were included. The two different devices provided highly correlated counts (P<0.0001) with no significant differences between them. US counts (12.0 ± 3.7 on average) significantly underestimated true numbers, with average accuracies of $71.4 \pm 24.6\%$ and $70.7 \pm 24.5\%$ for live and live + dead embryos. US counts on the left and right sides were significantly different, although true counts were similar. Average accuracies for live embryos were better on the right side (81.0%) than on the left side (63.2%). The accuracy of US counts varied according to replicates and was significantly different between pregnancy stages. It was better at 27 than at 24 days with average accuracies of $80.8 \pm 24.6\%$ vs $62.0 \pm 20.9\%$ for live embryos. US accuracy was negatively related to true embryo numbers (r= -0.446 P<0.0001) and US underestimations were partly related to the high frequency of large litters (40% gilts with more than 18 live + dead embryos in this trial).

As a conclusion, ultrasonograghy, as performed in this trial, is not a suitable tool to count embryos. The accuracy of counting could be improved by testing different devices, transducers and scanning methods. Whether technical improvements could overcome major issues related to anatomic constraints and uterine crowding in highly prolific sows remains unknown.