EFFICIENCY OF TRANSRECTAL ULTRASONOGRAPHY FOR PREGNANCY DIAGNOSIS OF ILE DE FRANCE EWES DURING THE FIRST MONTH OF GESTATION

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Summary


The aim of the present study was to test transrectal real-time B-mode ultrasonography for pregnancy diagnosis in ewes from the Ile de France breed on day 16, 23 and 30 after fixed-time artificial insemination. The experiment was carried out with 22 multiparous pure-bred Ile de France ewes aged 2–5 years. Diagnosis of pregnancy was based on the presence of enlarged uterine lumen with amniotic fluid and visualisation of embryo. The accuracy (Ac %), sensitivity (Se %) and specificity (Sp %) of the technique were determined. The gestational phase influenced significantly (P<0.01) the accuracy of the transrectal ultrasonography approach for pregnancy diagnosis. At day 16 the accuracy was 50.0%, whereas at day 23 and at day 30 it reached 72.73% and 90.91% respectively.

Key words: early pregnancy diagnosis, ewe, Ile de France, transrectal ultrasonography

The intensive sheep management and the widespread application of controlled breeding techniques, such as artificial insemination and out-of-season breeding, increase the need for an accurate and practical test for early pregnancy diagnosis (Karen, 2003). The real-time B-mode ultrasonography is the earliest, most accurate, safest, fastest, and most economical method of pregnancy diagnosis in sheep at farm level (Ganaie et al., 2009). There are two approaches used to study the female reproductive tract of small ruminants – transrectal and transabdominal, and the approach of choice depends on diagnosis that is needed, probes and size of flocks (Kähn, 2004).

The transrectal approach is more suitable for pregnancy diagnosis till the 35th day of gestation (Kähn, 2004). Its accuracy at these early stages is low, so in practice, it is better to wait until days 32–
34, when the efficiency reaches 85–100% depending on operator experience (Gonzalez-Bulnes et al., 2010).

In our previous works (Metodiev et al., 2010; 2012; 2014; Metodiev, 2013) we have used transabdominal approach and sector probe with frequency 5 MHz in ewes from the Synthetic population of the Bulgarian milk sheep (SPBM). We have done a series of examinations from the 25th till the 84th gestation day first to diagnose early pregnancy and second – to determine values of some foetal growth measurements.

Numerous studies (Vassilev et al., 2004; Bonev et al., 2005; Yotov et al., 2005; Yotov, 2005; 2008ab; 2012; Maslev, 2008) in Bulgaria have been carried out to diagnose pregnancy diagnosis by ultrasound imaging in four breeds – Pleven Blackhead, Trakia Merino, Ile de France and Karakachan. Yotov (2012) noticed that before the 25th gestation day in ewes from Ile de France breed, the visualisation of embryos and their counting were more difficult and the examination - more time consuming.

The aim of the present study was to test transrectal real-time B-mode ultrasonography for pregnancy diagnosis of Ile de France ewes on days 16, 23 and 30 after fixed-time artificial insemination.

The experiment was carried out in May 2013, with 22 multiparous purebred Ile de France ewes, aged 2–5 years, raised in the experimental farm of the Institute of Animal Science – Kostinbrod. Estrus synchronisation was induced by two intramuscular injections of the synthetic analogue of prostaglandin F2α, given 9 days apart (13 ewes with 2.0 mg alfaprostol (1.0 mL Alfabedyl, Ceva Animal Health) and 9 ewes with 125 µg cloprostenol (0.5 mL Synchromate, Bremer Pharma, Germany). All ewes showed estrus (tested by teasers) by the 46th hour after the second treatment and were inseminated artificially in fixed time, with fresh, non-diluted semen, at a dose of 0.2 mL on 48 h and 56 h. Only ejaculates with volume ≥0.5 mL and motility 70% were used.

Three consecutive ultrasound examinations were done on day 16, day 23 and day 30 after the artificial insemination. The examinations were done in the morning between 9.00–11.00 AM and last feeding of the animals was during 5.00–6.00 PM on the previous day. Ultrasound examinations were conducted in standing position of ewes. First the ampulla recti was evacuated from faeces, after that the ultrasound probe, covered with gel, was inserted with the help of a cradle into the rectum. The equipment included digital portable ultrasound system ALOKA ProSound 2 (Aloka Co., Ltd.) supplied with electronic linear transducer UST 5820, with frequency of 7.5 MHz. Diagnosis of pregnancy was based on the presence of enlarged uterine lumen with amniotic fluid (for day 16, day 23 and day 30) and visualisation of embryo (day 23 and day 30).

Validity of detection of pregnancy was verified through lambing dates, as normal pregnancy lasted average 150±7 days and the day of AI was accepted as day 1 of pregnancy.

The following diagnoses were given during the study: true positive (pregnant), false positive (non-pregnant), true negative (non-pregnant), and false negative (pregnant). The test parameters were determined (Yotov, 2005): accuracy (Ac %) – number of true diagnoses/total number of diagnoses; sensitivity (Se %) – number of true positive diagnoses/total number of positive diagnoses; specificity (Sp %) – number of true negative diagnoses/ total number of negative diagnoses.
The significance of the accuracy of this technique for pregnancy diagnosis at different gestational days was tested with Cochran's Q test with the statistical software SPSS 19. Cochran's Q test is a non-parametric test, which is used when the studied groups are more than 2, the groups are related, and data are binomial (1 – correct diagnosis and 0 – false diagnosis).

The gestational phase influenced significantly (P<0.01) (Table 1) the accuracy of the transrectal approach of ultrasonography for pregnancy diagnosis. At day 16 the accuracy was 50.0%, whereas at days 23 and 30 it reached 72.73% and 90.91% respectively. The first sign of pregnancy was enlarged uterine lumen with amniotic fluid. A similar finding was observed by Gonzales-Bulnes et al. (1998) with 7.5 MHz probe on day 12.8 after insemination in Machega dairy ewes. Yotov (2008a) firstly found conceptus at day 20 with accuracy 40% in Trakia Merino breed, whereas in Ile de France sheep the first visualisation of embryo was possible at day 25 with the same accuracy 40%. At day 23 we obtained accuracy of 72.73% in early pregnancy diagnosis, as all true positive diagnoses were based on visualisation of embryos. In our previous study (Me-todiev, 2013), we achieved accuracy of 94.12% in early pregnancy diagnosis (by enlarged uterine lumen and embryo presence) with transabdominal ultrasound and 5 MHz sector probe in SPBM ewes, which in our belief was breed-specific. It is therefore suggested that despite the numerous studies in that field, it is necessary to carry out more researches to establish the deviations of the criteria of early pregnancy diagnosis within the breed.

The other two parameters – sensitivity and specificity, also increased their values and at day 30 they were – 83.33% and

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<tr>
<th>Days of pregnancy</th>
<th>Diagnosis</th>
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<tr>
<td></td>
<td>day 16</td>
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<tr>
<td>true positive</td>
<td>5</td>
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<tr>
<td>false positive</td>
<td>4</td>
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<td>true negative</td>
<td>6</td>
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<td>false negative</td>
<td>7</td>
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Table 1. Number of diagnoses and values of the parameters obtained on the studied days

* Cochran’s Q = 8.714, level of significance P<0.01.
100% respectively. Our results for day 23 and day 30 were in correspondence to those, obtained from the other authors. The sensitivity and specificity increased with progression of the pregnancy and ranged between 65.0 % and 87.0 % at days 25 to 50, depending on the breed, age and parity of the ewes, experience of the operator and the technique of the examination (Karen et al., 2001). Yotov (2008a) obtained 81.8% sensitivity and 69.2% specificity between gestation days 20–30 in Ile de France ewes.

On the basis of the obtained results, we share the opinion of Martinez et al. (1998) that the pregnancy diagnosis with this technique should be carried out after day 24. At day 23 we obtained an accuracy of 72.73%, sensitivity – 66.67% and specificity – 80.0%.

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