UTERINE DEVELOPMENT IN PREPUBERTAL GILTS
AFTER SINGLE OR MULTIPLE STIMULATION
BY GONADOTROPHINS

HELEN McMENAMIN and G. J. KING

Department of Animal and Poultry Science, University of Guelph,
Guelph, Ontario, Canada

(Received 22nd December 1973)

Following treatment with gonadotrophins (Casida, 1935), pregnancy can be
initiated in prepubertal gilts but the corpora lutea regress and gestation is not
maintained for more than 20 to 25 days (Dziuk & Gehlbach, 1966). It has been
suggested (Shaw; McDonald & Baker, 1970) that the uterus in the immature
animal may be insufficiently developed to allow proper implantation and to
prevent uterine luteolysis. Ovarian steroids are required throughout the
prepubertal period for normal uterine growth (R. G. Brown and G. J. King,
unpublished observations) but uterine weight increases more rapidly after the
first oestrus (Dyck, 1971). In an attempt to develop the prepubertal uterus and
thus increase the chance of maintaining pregnancy, eight gilts (treated group)
were injected with 1000 i.u. PMSG followed 72 hr later by 800 i.u. HCG at
approximately 100, 121 and 142 days of age. Eight additional gilts (control
group) were also induced, by gonadotrophin injections, to ovulate at approxi-
mately 142 days of age. All gilts were inseminated 30 hr after the final HCG
injections, and 2 days later their reproductive tracts were recovered at autopsy.

Sections approximately 4 cm long were cut from the oviducal, middle and
cervical regions of each uterine horn and were fixed in Bouin’s solution for 24 hr.
The tissue was then trimmed to give a true cross-section, dehydrated, embedded,
sectioned and stained with Veerhoff-Van Giesen’s stain. Cross-sections were
photographed through a stereomicroscope and enlarged to 8 in. × 10 in. prints.
The image of the entire uterus was cut out from each print and weighed. The
image of the endometrium was then cut free of the remainder of the uterus and
weighed separately. These weights were used to give a ratio of endometrium to
total uterine area.

This ratio was calculated for all locations and both sides from four gilts in
the treated and control groups. A least squares analysis was performed on these
ratios and the total variance was partitioned into components for treatment,
location, side and for all possible interactions as shown in Table 1. No significant
interactions or differences were indicated (P>0·05) and since a considerable
amount of effort was required to collect ratios for all eight locations in each
animal, a single section was selected to represent the entire uterus. The ratio of
endometrial area to total uterine cross-sectional area for a section from the
Table 1. Partitioning of variance for ratio of endometrium to total uterine area in gilts treated with gonadotrophins

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>Mean squares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location (L)*</td>
<td>2</td>
<td>0.00917</td>
</tr>
<tr>
<td>Side (S)†</td>
<td>1</td>
<td>0.00164</td>
</tr>
<tr>
<td>Treatment (T)‡</td>
<td>1</td>
<td>0.000012</td>
</tr>
<tr>
<td>L×S</td>
<td>2</td>
<td>0.000041</td>
</tr>
<tr>
<td>L×T</td>
<td>2</td>
<td>0.000936</td>
</tr>
<tr>
<td>S×T</td>
<td>1</td>
<td>0.00204</td>
</tr>
<tr>
<td>L×S×T</td>
<td>2</td>
<td>0.000037</td>
</tr>
<tr>
<td>Error</td>
<td>34</td>
<td>0.00314</td>
</tr>
</tbody>
</table>

* Sections from oviducal, middle or cervical regions of the uterus.
† Sections from left or right uterine horn.
‡ One group was treated at 142 days of age and a second group was treated at 100, 121 and 142 days.

middle of the left horn from eight animals in the treated and control groups were compared by a Student's t test. The mean ratio for the treated group (0.6036±0.05) was higher than the mean for the control group (0.5620±0.05) but the difference was not significant (P>0.05). The uteri were not weighed individually at the time of sampling but there were no obvious differences in size. The treatment with gonadotrophins 3 and 6 weeks before the treatment for induction of pregnancy did not seem to alter the ratio of endometrium to total uterus.

Hadek & Getty (1959) reported that the tissue components of the porcine uterus grow at different rates, but based their findings on a small number of micrometer readings. The irregularity of the uterus in cross-section does not facilitate the micrometer approach. The method described above provides a simple and accurate assessment of endometrial development. It might be further improved by combination with the weight of uterus.

This project was supported by the Ontario Ministry of Agriculture and Food and the National Research Council of Canada.

REFERENCES


