CORPORA LUTEA FUNCTION AND PREGNANCY MAINTENANCE IN GILTS FOLLOWING UNILATERAL OVARIECTOMY, UNILATERAL UTERINE HORN TRANSECTION AND UNILATERAL OVARIECTOMY-UTERINE HORN TRANSECTION

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Summary

A TOTAL of 47 crossbred gilts were randomly assigned to one of three treatment groups: Group I was unilaterally ovariectomized only and served as the control; Group II gilts had one uterine horn transected with both ovaries intact; and Group III gilts had one uterine horn transected and the ipsilateral ovary removed. Surgery was performed prior to the estrus at which the gilts were mated to test the hypothesis that a sterile uterine horn might not be luteolytic if there was no ipsilateral functional ovary since the stimulus for a uterus to produce a luteolytic factor might be “local” in nature. The pregnancy rate for Groups I, II and III was 87.5, 13.7 and 18.8%, respectively. Since the pregnancy rates for Groups II and III were significantly lower than for Group I but not significantly different from each other, the data suggest that a functional ovary ipsilateral to a non-gravid uterus is not required for that uterus to exert a luteolytic effect. One must conclude, therefore, that the stimulus for a sterile uterine horn to exert a luteolytic effect is systemic rather than local.

Introduction

The control of luteal function in the pig has received considerable attention as indicated by the reviews of Anderson and Melampy (1967), Melampy and Anderson (1968), Moor (1968) and Schomberg (1969). Du Mesnil du Buisson (1961), Anderson (1966) and Anderson, Rathmacher and Melampy (1966) found that unilateral regression of corpora lutea (CL) occurred in partially hysterectomized pigs which had various portions of one uterine horn removed while pregnancy was established in the opposite uterine horn; however, when a substantial portion of a non-gravid horn was present there was complete

CL regression and pregnancy was terminated. The data suggest that the non-gravid uterine horn exerts a local luteolytic effect on the CL of the ipsilateral ovary and then a systemic effect on CL of the contralateral ovary.

Du Mesnil du Buisson (1966) according to Moor (1968) indicated that by unilaterally ovariectomizing gilts prior to the estrous period at which they were mated, ovarian compensation occurred and an increased number of embryos could be maintained in the pregnant uterine horn even when the contralateral uterine horn had been transected to insure that it remained non-gravid. He suggested that the increased number of embryos could act either by increasing the placental luteotrophic stimulus or by increasing the degree of protection for corpora lutea in the ovary ipsilateral to the gravid uterus. If one is willing to accept the concept of a local luteolytic pathway between a uterine horn and its adjacent ovary, the possibility also exists that there is a local pathway whereby the ovarian steroids of a particular ovary stimulate the ipsilateral uterine horn.

The objective of this study was to evaluate the possibility that a local relationship must exist between a uterine horn and its ipsilateral ovary before that uterine horn is stimulated to produce a luteolytic substance.

Experimental Procedure

A total of 47 crossbred gilts which had experienced at least three estrous cycles were randomly assigned to one of three treatment groups: Group I was unilaterally ovariectomized only and served as the control group; Group II gilts had one uterine horn transected with both ovaries left intact; and Group III gilts had one uterine horn transected and the ovary ipsilateral to that uterine horn was removed. Uterine horn transection was accomplished by cutting through each uterine horn as close as possible to the

1 Department of Animal Science, Florida Agricultural Experiment Station, Journal Series No. 4085.
external bifurcation of the uterine horns and the cut ends were sutured closed. All surgery was performed between days 3 and 9 of the estrous cycle prior to mating. After surgery the gilts were observed for estrus twice daily at 12-hr. intervals and mated at 12 hr. and at 24 hr. after onset of estrus. All females were slaughtered 22 to 28 days after mating and the reproductive tracts were examined for corpora lutea and embryos.

**Results and Discussion**

The data are summarized in table 1. The The unilaterally ovariectomized gilts which served as controls had an average of 12.5 CL. Intrauterine migration occurred in all of the pregnant animals so that there was an average of 4.4 and 4.8 embryos in the left and right uterine horns, respectively. A conception rate of 87.5% indicated that the stress of surgery did not significantly impair fertility at the first post-operative estrus.

Gilts in Group II which had one transected uterine horn with its ipsilateral ovary intact had a pregnancy rate of only 13.3% which is in agreement with the data of du Mesnil du Buisson (1961) and Anderson, Rathmacher and Melampy (1966). This effect has been attributed to the luteolytic nature of the non-gravid uterine horn which is local in nature initially but later becomes systemic (du Mesnil du Buisson, 1961). The ovaries adjacent to the non-gravid uterine horn of the two pregnant gilts of Group I had one CL and no CL, respectively. This type of unilateral CL regression has previously been observed (Anderson, 1966).

The gilts which were unilaterally ovariectomized with the ipsilateral horn transected (Group III), had a pregnancy rate of 18.8 percent which was not significantly different from that for gilts in Group II. Average ovulation rate and litter size for the three pregnant gilts was 12.3 and 9.7, respectively, which was not significantly different from that of the control (unilaterally ovariectomized) females which had an average of 12.5 CL and 9.2 embryos. The average number of CL or corpora albicantia at slaughter was 12.1 for non-pregnant females in this group.

The average interval from mating to onset of the subsequent estrus was 19.5, 19.8 and 19.3 days for non-pregnant gilts of Groups I, II and III, respectively, which indicates that any embryonic development resulting from mating was not sufficient to alter the expected length of the estrous cycle.

The data from the unilaterally ovariectomized-ipsilateral-horn transected groups do not support the findings of du Mesnil du Buisson (1966) as reported by Moor (1968) since the pregnancy rate for this group was significantly lower than that of the controls and not significantly different from that of gilts in which the uterine horn was unilaterally transected with the adjacent ovary intact. These data suggest that the stimulus for a non-gravid uterine horn to exert a luteolytic effect is not dependent upon a "local" relationship between that uterine horn and a functional ovary. Rather, the stimulus for the uterine horn to produce a luteolytic substance, such as that described by Schomberg (1969), appears to be systemic.

The gilts in Group III had essentially the same number of potential embryos (based on CL counts) as the females in Group I; however, the possible increase in placental luteotrophic stimulus or degree of protection for the CL as suggested by du Mesnil du Buisson (1966) was not adequate in this experiment to allow maintenance of pregnancy to the same extent as that for females in Group I. Gilts in Group I differed from those in Group III in that embryos were present in each uterine horn and were able to "protect" the CL in some manner. According to Dhindsa and Dzuik (1968) embryos must be present in both uterine horns between days 10 and 12 of pregnancy to exert their protective effect against uterine luteolytic factors.

**TABLE 1. THE EFFECT OF UNILATERAL OVARIECTOMY, UNILATERAL UTERINE HORN TRANSECTION AND UNILATERAL AVARIECTOMY-UTERINE HORN TRANSECTION ON THE REPRODUCTIVE PERFORMANCE OF SWINE**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unilateral Ovariectomy</th>
<th>Unilateral Uterine Horn Transection</th>
<th>Unilateral Ovariectomy-Uterine Horn Transection</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. females</td>
<td>16</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>No. females pregnant</td>
<td>14</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Females pregnant, %</td>
<td>97.5%</td>
<td>73%</td>
<td>78.8%</td>
</tr>
<tr>
<td>No. corpora lutea, avg.</td>
<td>12.5</td>
<td>8.5</td>
<td>12.5</td>
</tr>
<tr>
<td>No. embryos, avg.</td>
<td>9.2</td>
<td>5.0</td>
<td>9.7</td>
</tr>
<tr>
<td>Avg interval from mating to estrus, days</td>
<td>19.5</td>
<td>19.8</td>
<td>19.3</td>
</tr>
</tbody>
</table>

* Based on pregnant females only.
* Based on non-pregnant animals only.
* Significantly (P<.01) greater than for the other treatment groups.

**Literature Cited**