THE REPRODUCTIVE PERFORMANCE OF EWES GRAZING BIRDSFOOT TREFOIL-SMOOTH BROMEGRASS, ALFALFA-SMOOTH BROMEGRASS AND N FERTILIZED SMOOTH BROMEGRASS PASTURES

by

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INTRODUCTION

Feed costs represent 50 to 60 percent of the total production costs in most sheep operations. This emphasizes the need to take advantage of the sheeps' ability to make maximum use of forage crops to supply dietary energy.

Pasture harvested directly by sheep is an economical method for maximizing forage utilization. A legume-grass mixture in a grazing program offers several advantages compared with an all grass system of management. Lower N fertilization costs, uniform seasonal production and high yields make legume-grass pastures a valuable tool in meeting the sheep's nutrient needs (Posler et al., 1979).

Birdsfoot trefoil (Lotus corniculatus) is a perennial forage legume that is gaining popularity as a pasture crop. However, Engle (1957) and Pieterse (1959) have detected the presence of estrogenic activity in the plant. Bennetts (1946), studying subterranean clover (Trifolium subterraneum) in Western Australia demonstrated a reduction in the reproductive performance of ewes grazing plants that contain estrogen-like compounds.

In this study, we compared the reproductive performance of ewes grazing birdsfoot trefoil - smooth bromegrass (Bromus inermis), alfalfa (Medicago sativa) - smooth bromegrass and N fertilized smooth bromegrass pastures. These will be referred to as BFT-Br, Alf-Br and Br+N; respectively, throughout the text. References to clover studies refer to subterranean clover.

LITERATURE REVIEW

Birdsfoot Trefoil

Birdsfoot trefoil (Lotus corniculatus) is a perennial forage legume utilized for pasture, hay and silage. Mature plants have many well-branched stems arising from a single crown, reaching 60 to 90 cm under favorable growing conditions. A well-developed taproot has numerous lateral branches in the upper 30 to 60 cm of soil. Shoots can develop from root segments, aiding in plant survival when soil heaving causes severing.

Birdsfoot trefoil will grow on a much wider range of soil conditions and fertility regimes than will alfalfa. The plant tolerates soil types ranging from clay to sandy loam. It will grow on poorly drained, droughthy, or infertile soil. Seedlings can nodulate in soils with pH values from 4.5 to 7.9 (Seaney, 1973).

Best yields of birdsfoot trefoil are obtained on fertile, moderately well-drained to well-drained soil with a pH of 6.2 to 6.5. Its natural reseeding ability contributes to its persistence as a perennial over many grazing seasons (Chapman and Carters, 1976; MacDonald, 1961; Seaney and Hensen, 1970.).

Nutritive values for birdsfoot trefoil, alfalfa and smooth bromegrass are shown in table 1 (Van Soest, 1971).

Posler et. aI. (1979) reported ewe grazing days per acre of 1012, 907, and 904 in 1977; and 861, 721, and 556 in 1978, respectively, for Alf-Br, BFT-Br, and Br+N. Lamb average daily gains per day were .22, .20, and .20 kg, respectively.

Although birdsfoot trefoil's excellent quality, wide adaptation, high yield and persistence, combined with its nonbloating characteristics

make it an excellent pasture legume, the presence of estrogenic compounds in the plant may affect its desirability. Pieterse (1956), using uterine weight increase in immature mice as a criterion, detected estrogenic activity in birdsfoot trefoil. Engle (1959), reported that ewes grazing trefoil showed a 21 d. delay in conception dates and averaged .8 more services per pregnancy than ewes grazing nonestrogenic bluegrass (Poa. pratensis) pasture.

Detection of Estrogenic Activity

Growth of the uterus by cell division and protein synthesis is induced by estrogen from the ovary (Hafez, 1974). Braden et al. (1967) showed an increase in the uterine weight of ovariectomized ewes grazing pasture containing estrogenic compounds.

Estrogen from the ovary stimulates the secretion of cervical mucus. Qualitative changes in the viscosity and arrangement of the macromolecules in the mucus occur throughout the estrous cycle (Hafez, 1974). Kelley and Lindsay (1975), Lightfoot (1974), Lindsay and Francis (1968), and Lindsay and Kelley (1970), using ovariectomized ewes fitted with absorbent cervical plugs showed an increase in the amount and fluidity of cervical mucus in ewes grazing pastures containing estrogen-like compounds.

Estrogen will also induce extensive lobulo-alveolar growth in the mammary system (Hafez, 1974). Braden et al. (1964) and Millington et al. (1964) reported an increase in udder size and in teat elongation in wethers grazing forages containing estrogenic compounds. In 1978, an increase in udder size was noted in virgin ewe lambs grazing birdsfoot trefoil pastures in this study (personal observation).

Structure and Metabolism of Isoflavones

Lambing percentages fell from 80% to 30% among ewes grazing estrogenic subterranean clover in Western Australia (Bennetss, 1946).

The plant compounds responsible for the decline in ewe reproductivity were isolated and identified as isoflavones: formononetin, daidzein, genistein, and biochanin A. A significant re-evaluation of these compounds was undertaken upon the discovery that they undergo extensive metabolism in the rumen, yielding compounds of very different estrogenicity than the parent compounds (Braden et al., 1967; Cox, 1978; Lindsay and Kelley, 1970; Shutt et al., 1970).

The structure and metabolism of the isoflavones are shown in figures 1 and 2.

Biochanin A and genistein, when administered parenterally to sheep, exhibit greater estrogenic potency than does formononetin (Braden et al. 1971). However, upon ingestion by the ruminant, these compounds are demethylated to inactive paraethylphenol (Braden et al., 1967, and Lindsay and Kelley, 1970). Results of grazing studies indicate that the response of sheep to pastures high in genestein and biochanin A diminished with increasing periods of intake. It was concluded sheep may develop an ability to render these compounds ineffective. No such system of adaptation exists for formononetin (Lindsay and Francis, 1968; Lindsay and Kelley, 1970).

Formononetin, which has little or no estrogenic activity itself, is converted in the rumen to equol, which is highly estrogenic (Shutt, 1968; Matches, 1972; and Lindsay et al.,1970). Millington et al. (1964) using teat length increase in wethers showed that the estrogenic activity of several strains of subterranean clover was correlated with the formononetin content of the plant material. According to Kelley and Lindsay

(1975), only those species of subterranean clover that contain high levels of formononetin have been shown to cause clinical or subclinical cases of clover disease, the disease associated with estrogen-related reproductive problems.

In addition to the isoflavones found in clover species, coumesterol, a coumestan, has also been implicated as having estrogenic activity. The coumestans are found primarily in the Medic group of plants. Analysis of the birdsfoot trefoil grazed in this study showed no coumestrol present in the plant material (G. Lookhardt, personal communication).

Effects on Reproduction

In a study by Barrett (1965) lambing, expressed as a percent of ewes bred, decreased from 88% to 25% in a six year period among ewes grazing estrogenic clover, while ewes grazing non-estrogenic oat pasture showed a decrease from 88% to 66% over the same period.

Fels (1968) comparing 39 ewes grazing estrogenic clover pasture to 60 ewes grazing non-estrogenic oat pasture found these differences: ratio of live embryos to eggs shed 8:39 vs 56:73; fertilization rates of 63% vs 89%; and surviving embryos to eggs fertilized of 8:17 vs 56:75 for clover and oats, respectively.

Similarly, research from the Western Australia Department of Agriculture showed fertilization rates of 74% vs 92%, embryo mortality of 34% vs 19%, and lambing percent of 67 vs 90 for estrogenic clover and non-estrogenic clover pastures, respectively.

Ch'ang (1961) observed a sudden onset of estrus without ovulation prior to the normal breeding season among ewe lambs grazing estrogenic subterranean clover in New Zealand. Other work by Ch'ang with mature ewes grazing estrogenic clover showed a normal estrus pattern among

ewes, although it was accompanied by a decrease in the proportion of ewes conceiving, as well as a delay in conception dates.

Fels (1968) contends that the primary cause of infertility in the ewes was a failure of fertilization associated with poor sperm penetration to the oviduct. The establishment of a reservoir of sperm in the cervix immediately after mating is necessary for normal conception in sheep (Hafez, 1975). An increases in the amount and fluidity of cervical mucus results in molecular threads too short for the sperm to follow up to the cervix. Lightfoot (1974) found that in ewes grazing estrogenic clover pastures, only 350 sperm reached the oviduct after mating, whereas the number in ewes not grazing estrogenic pastures was in excess of 17,000.

Variations in Level of Estrogenic Activity

Researchers investigating level and effect of estrogenic compounds in forages have observed widely variable results. A report by Moule (1964) emphasizes that the results obtained with grazing sheep do not necessarily reflect changes in the concentration of estrogenic compounds in the plant. Selective grazing, amount of plant material consumed, and effect of rumen microflora on the compounds may vary among pastures and between seasons.

The concentration of estrogenic compounds in the plant changes with plant growth and development. Research by Kitts et al. (1959) showed that the estrogenic activity of birdsfoot trefoil decreased as the stage of maturity increased. Potencies in terms of mcgms of D.E.S. (diethyl stilbesterol) per pound of dry matter were 22, 0, 0, 0, and 4 for vegetative, early bloom, late first bloom, late second bloom, and mid seed stages, respectively.

Kitts also contends that variation in losses of plant material during harvesting, extracting, diet mixing, digestion, and absorption will cause variability in results, as will seasonally induced changes that arise independent of the growth stages of the plant.

MATERIALS AND METHODS

Seventy-one seven month old fallborn Dorset x Rambouillet ewe lambs of similar genetic background were used in the study. The experiment consisted of two trials, each corresponding with the spring growth of birdsfoot trefoil, in May and June of 1979 and 1980.

TRIAL 1

Ewes were allotted to four groups based on weight. Three treatment groups consisted of 20 ewes averaging 37.5 kg. grazing BFT-Br, Alf-Br or Br+N pastures. Ewes were allowed to graze for ten d prior to the collection of data. The remaining 11 ewes were confined in a drylot (control group) and fed a maintenance diet.

Data was collected for a 36 d period. Ewes grazing BFT-Br were removed on day 19 to spray the pasture for cutworm infestation.

Ewes grazed for 12 h daily, then were grouped into semi-confined lots at night. Fifteen ram lambs and three mature rams fitted with marking devices were randomly allocated to the treatment groups each night. Ram mounting activity was used as an indication of estrus. Rams remained housed in semi-confinement during the day.

Blood samples were collected in vacutainer tubes by jugular puncture at three d intervals. Plasma was harvested after 15 min centrifugation at 2200 rpm and frozen. Progesterone levels in ng/ml were determined by radioimmunoassay as described by J.S. Stevenson et al. (1981).

Following the 36 d data collection period all ewes were grouped on smooth bromegrass pasture and exposed to rams. Conception dates were determined by subtracting 147 days from the date of lambing.

TRIAL 2

Trial 2 in 1980 used the same treatment pastures and animals. Twenty ewes were reallocated to each pasture so that ewes did not graze

the same treatment pasture in both trials. The drylot control group was deleted. Ewes were not permitted to graze the pastures before collecting data.

Blood samples were collected at the beginning of the trial and at three day intervals for 36 d. Plasma was harvested as in Trial 1.

Ewes marked was determined as in Trial 1 and date of lambing was used to determine conception dates.

RESULTS AND DISCUSSION

Trial 1

Estrual activity

There was no significant difference in number of ewes marked among ewes in the Alf-Br, Br+N and drylot control groups (Table 2). None of the ewes grazing BFT-Br were marked during the first 18 days of the study.

Lambing data

As shown in table 2 none of the ewes grazing any treatment pasture conceived during the course of the experiment, and only one ewe in the drylot group conceived at that time. There was no difference in conception rates among all groups during the 54 day post-trial breeding period.

Plasma progesterone

Results of radioimmunassay for plasma progesterone indicate that none of the ewes in any treatment group experienced normal cyclic estrual activity, as defined by Thornburn et al. (1969), during the course of the experiment(figure 3). According to J.S. Stevenson (1982 personal communication), progesterone concentrations of .5 ng/ml are indicative of luteal activity. Work by Thornburn et al. (1969) indicates that the concentration of progesterone in the peripheral plasma of ewes on day 0 of the estrous cycle is approx. .12 ± .1 ng/ml. Similar levels were measured in wethers by Yuthasastrakol (1974), and in anestrous and ovariectomized ewes by Thornburn (1969). Levels remained low during days 1-3 of the estrous cycle, increased to a mean concentration of 1.7 ng/ml between days 4 to 9, then remained constant or gradually increased during days

10 to 14 before declining rapidly on day 14 and 15 of the cycle.

Plasma progesterone levels of the ewes in this study are shown in tables 3 a,b,d and d.

Trial 2

No effect of plant estrogens was observed among ewes in Trial 2.

Results of ram marking activity and conception rates are shown in table 4. No differences were seen in number of ewes marked, number of ewes conceiving, average conception date or estrous cycle lengths among treatment groups.

The results of this experiment may have been altered by several factors. First, conducting the experiment during May and June to utilize the early vegetative growth of birdsfoot trefoil introduced several confounding factors that clouded results of Trial 1. Research has shown that although Rambouillet ewes are considered not to be seasonal breeders they are least likely to breed in May and June. The percent of ewes cycling during those months is reported at 2% and 7%, respectively. The Dorset breeding in the crossbred ewes used in the study should improve these percentages, though May and June would remain the period of deepest anestrous for Dorsets as well as Rambouillets.

Secondly, the fallborn ewe lambs used in Trial 1 weighed an average of 37.5 kg, approximately 70% of their mature weight. Hafez (1953) reported weight at puberty to be 69% of mature weight. Therefore, these ewes would be experiencing their first or second, and consequently highly irregular estrous cycles.

In addition, the concentration of estrogenic compounds in the plant material is highly variable from year to year and within seasons. It is also dependent on the stage of growth of the plant. The inability of the author to establish the presence and/or level of estrogenic compounds

in the plant material during the course of the study further confounds the results.

TABLE 1. COMPOSITION AND NUTRITIVE VALUE OF FEEDS

Feed	Crude Protein (%)	T.D.N. (%)	$N.E._m$ (Mcal)	$N.E._g$ (Mcal)	$N.E._l$ (Mcal)
Birdsfoot trefoil	16	61	1.30	.60	1.29
Alfalfa	17	57	1.22	.51	1.17
Smooth bromegrass	17	62	1.22	.51	1.17

from Van Soest (1971).

TABLE 2. REPRODUCTIVE PERFORMANCE OF EWES IN TRIAL 1

	Alf-Br	Br+N	BFT-Br	Drylot
No. of ewes	20	20	20	11
No. of ewes marked by rams	9	7	5[a]	3
No. of ewes conceived while on treatment pastures	0	0	0	1
No. of ewes conceived during post-trial breeding period	4	4	4	2

[a]Four of the five ewes marked were mounted on day 19 of the trial, after 36 h removal for pasture spraying.

TABLE 3a. PROGESTERONE CONCENTRATION (ng/ml) IN PLASMA OF EWES GRAZING ALF-BR

	Date of bleeding												
Ewe #	5/12	5/15	5/18	5/21	5/24	5/27	5/30	6/2	6/5	6/8	6/11	6/14	6/17
1	.25	.12	.32	2.71[a]	5.76[a]	1.23	.20	.13	.24	.05	.12	<.06	.08
2	.21	.14	.14	.07	<.06	.21	.06	<.06	.25	.34	<.06	.16	.12
3	.08	.08	.20	<.06	.07	.43	<.06	<.06	.13	.08	<.06	.11	.12
4	.09	.45	1.32[a]	1.84[a]	2.86[a]	.90[a]	.31	.13	.19	.17	<.06	.10	<.06
5	.06	.06	.11	<.06	<.06	.49	.10	.15	.08	<.06	.28	.08	<.06
72		<.06	.08	.25	.09	.11	.61	.08	.17	.22	.07	.10	.08
7	.17	<.06	.15	.17	<.06		.06	.08	.10		.11	.12	.11
8	.08	.09	<.06	.12			<.06	<.06	.10	.19	.16	.17	.07
9	.12	.07	1.82[a]	.19			.17	.10	.09	.08	.24	.15	.07
10	.57[a]	<.06	.55[a]	2.45[a]			.18	.15	<.06	<.06	.30	.08	.14
11	.06	.07	.14	.26			.16	.07	.11	<.06	.26	.08	.11
12	1.59[a]	1.62[a]	1.81[a]	3.76[a]			.06	.10	.15	.06	.07	.09	.07
13	.09	.08	<.06	.52[a]			.06	.13	.17	.09	.06	.17	.06
14	.09	<.06	.07				.09	.14	.21	1.03[a]	.29	.07	<.06
15	.08	.10	<.06	.15			.09	<.06	.06	.10	.07	.24	<.06
16	2.94[a]	.98[a]	1.71[a]	.44			.09	.14	<.06	.16	.14	.07	.11
17	.11	.14	.12	<.06			.07	.19	.09	.24	.11	<.06	<.06
18	.15	.37	.16	<.06			<.06	.19	.21	.16	<.06	.08	.24
19	.23	.06	.01	.13			.09	.16	<.06	.08	<.06	.06	.06
20	<.06	.27	1.13[a]	2.46[a]			.07	.12	.16	.10	.13		.25

[a]Values > .50 ng/ml

TABLE 3b. PROGESTERONE CONCENTRATION (ng/ml) IN PLASMA OF EWES GRAZING N FERTILIZED SMOOTH BROMEGRASS

Ewe #	Date of bleeding 5/12	5/15	5/18	5/21	5/24	5/27	5/30	6/2	6/5	6/8	6/11	6/14	6/17
41	.24	<.06	.16	.12	.10	.17	.11	.24	.12	.15	.11	.19	.11
42	.16	<.06	.10	.20	<.06	.62[a]	.07	<.06	.16	.10	.07	.14	.14
43	.12	.13	<.06	.06	.26	.30	.16	<.06	.07	<.06	.10	.07	.15
44	.09	<.06	.20	.08	.06	.10	<.06	<.06	<.06	.11	.09	<.06	<.06
45	.11	<.06	.10	.88[a]	.09		<.06	.13	.14		<.06	<.06	.12
46	.21	<.06	.12	<.06	<.06	1.06[a]	.10	.11	.14	.12	.15	.13	<.06
47	.11	.07	<.06	.11	<.06	.32	.08	<.06	.17	<.06	.31	.64[a]	1.23[a]
48	<.06	<.06	.09	<.06	<.06	.47	<.06	<.06	.38	.07	.15	.07	.08
49	.13	.20	.24	<.06	.23	.50	.13	.11	.15	.07	.16	.12	<.06
50	.10	<.06	.12	.19	<.06	.29	.07	<.06	.16	<.06	.22	<.06	.11
51	<.06	.18	<.06	.07	<.06	.69[a]	<.06	.09	.16		.15	.07	.06
52	<.06	<.06	<.06	.10	<.06	.58[a]	<.06	.24	<.06	.07	.12	.09	<.06
53		.11	.11	.12	.06	.54[a]	.13	.12	.23	.17	.11	<.06	.08
54	<.06	<.06	.14	.10	<.06	.12	.12	.26	.09	.16	.17	<.06	<.06
55	.21	<.06	.16	.07	.07	.31	.06	.10	<.06	.10	.24	.10	.11
56	.23	.10	<.06	.52	<.06	.48	1.23[a]	1.51[a]	1.53[a]	.37	.24	.23	.06
57	.07	.16	.17	.08	.06	.28	<.06	.25	.16	.06	.10	<.06	.10
58	.68	<.06	<.06	.19	.10	.12	.70	.06	<.06		.08	.23	.08
59	.27	.26	.30	.08	.15		<.06	.19	.49	.11	.68[a]	.10	.22
60	<.06	.20	<.06	<.06		.65[a]	.65[a]	<.06	.07	<.06	<.06	.15	<.06

[a]Values > .50 ng/ml

TABLE 3c. PROGESTERONE CONCENTRATION (ng/ml) IN PLASMA OF EWES GRAZING BFT-BR

	Date of bleeding												
Ewe #	5/12	5/15	5/18	5/21	5/24	5/27	5/30	6/2	6/5	6/8	6/11	6/14	6/17
21	.14	.09	.06	.11			<.06	.08	<.06	.16	.07	.09	.15
22	<.06	.15	.12	<.06			.09	<.06	.16	<.06	.18	.07	.14
23	<.06	.07	.08	.17			<.06	.12	.16	<.06	<.06	<.06	<.06
24	<.06	.30	<.06	.07			.24	.12	.11	.07	<.06	.11	.08
25	.08	.01	.11	.09	.17	.37	.07	.09	.06	.07	.13	.10	.06
26	.08	.13	.29	.11	.16	.45	<.06	.18	.10	.07	<.06	.16	.15
27	<.06	.18	<.06	.06	.06	.19	.08	<.06	.09	.13	<.06	.10	<.06
28	.11		.11	.11	<.06	.27	.23	<.06	.25	<.06	.23	.15	.18
29	<.06	.08	.11	.26	<.06	.27	.17	.09	<.06	<.06	<.06	.06	.12
30	<.06	<.06	.15	.16	<.06	.11	.18	.38	.52[a]	1.34[a]	.23	.06	.06
31	.08	.13	.10	.13	<.06		.15	.25	.27	1.10[a]	2.16[a]	.84[a]	.35
32	.11	<.06	<.06	<.06	.06	.20	.14	.17	.12	.11	.08	.06	.07
33	<.06	.10	.10	.11	.06	.25	.07	.24	<.06	<.06	<.06	<.06	<.06
34	.18	<.06	.43	.26	.23	.51[a]	<.06	<.06	.08	<.06	<.06		.06
35	.11	<.06	.08	<.06	.09	.26	.16	<.06	.10	.10	<.06	.20	<.06
36	<.06	<.06	.77[a]	<.06	.10	.68[a]	<.06	.15	.16	.77[a]	1.29[a]	1.76[a]	.40
37	<.06	.09	.10	<.06	<.06	.19	<.06	<.06	.18	<.06	<.06	.13	.09
38	.09	.17	<.06	<.06	.09	.02	<.06	.10	.08	.13	<.06	<.06	<.06
39	<.06	.11	<.06	.07	.22	2.04[a]	<.06	.29	<.06	.13	.07	.08	<.06
40	.12	<.06	.12	.15	.12	.51[a]	.13	.12	.12	<.06	.12	.06	.20

[a]Values > .50 ng/ml

TABLE 3d. PROGESTERONE CONCENTRATION (ng/ml) IN PLASMA OF DRYLOT CONTROL EWES

Ewe #	Date of bleeding 5/12	5/15	5/18	5/21	5/24	5/27	5/30	6/2	6/5	6/8	6/11	6/14	6/17
61	<.06	.12	<.06	.19	.27	<.06	<.06	<.06	.20	.15	.43	.82[a]	1.64[a]
62	<.06	.51[a]	<.06	.11	.16	.14	.08	<.06	.07	.75[a]	1.05[a]	.82[a]	.26
63	.10	.12	.16	.10	.17	.16	<.06	.10	.11	<.06	.09	<.06	<.06
64	<.06	.13	<.06	.13	.08	.07	<.06	.12	<.06	<.06	.27	.12	<.06
65	.11	<.06	.19	.12	<.06	.42	<.06	.06	.07	.10	.16	.11	.06
66	.14	<.06	.34	1.06[a]	1.10[a]	.52[a]	.10	.46	.48	1.27[a]	1.88[a]	.67[a]	<.06
67	.07	.08	.89[a]	2.57[a]	3.12[a]	.28	<.06	.12	.26	.07	.36	.21	.08
68	.06	.07	.17	.12	.24	1.05[a]	.08	.22	.06	.08	.13	.12	.05
69	.08	<.06	<.06	<.06	.09	.14	<.06	<.06	.14	<.06	<.06	<.06	.20
70	.11	<.06	.17	<.06	<.06	.64[a]	<.06	<.06		<.06	.12	<.06	.12
71	.54[a]	.66[a]	1.53[a]	1.35[a]	<.06	.21	.07	.06	.38	1.98[a]	2.91[a]	.08	.64[a]

[a]Values > .50 ng/ml

TABLE 4. REPRODUCTIVE ACTIVITY OF EWES IN TRIAL 2

	Alf-Br	Br+N	BFT-Br
No. of ewes	20	20	20
No. of ewes marked by rams	11	11	14
No. of ewes conceived while on treatment pastures	3	7	6

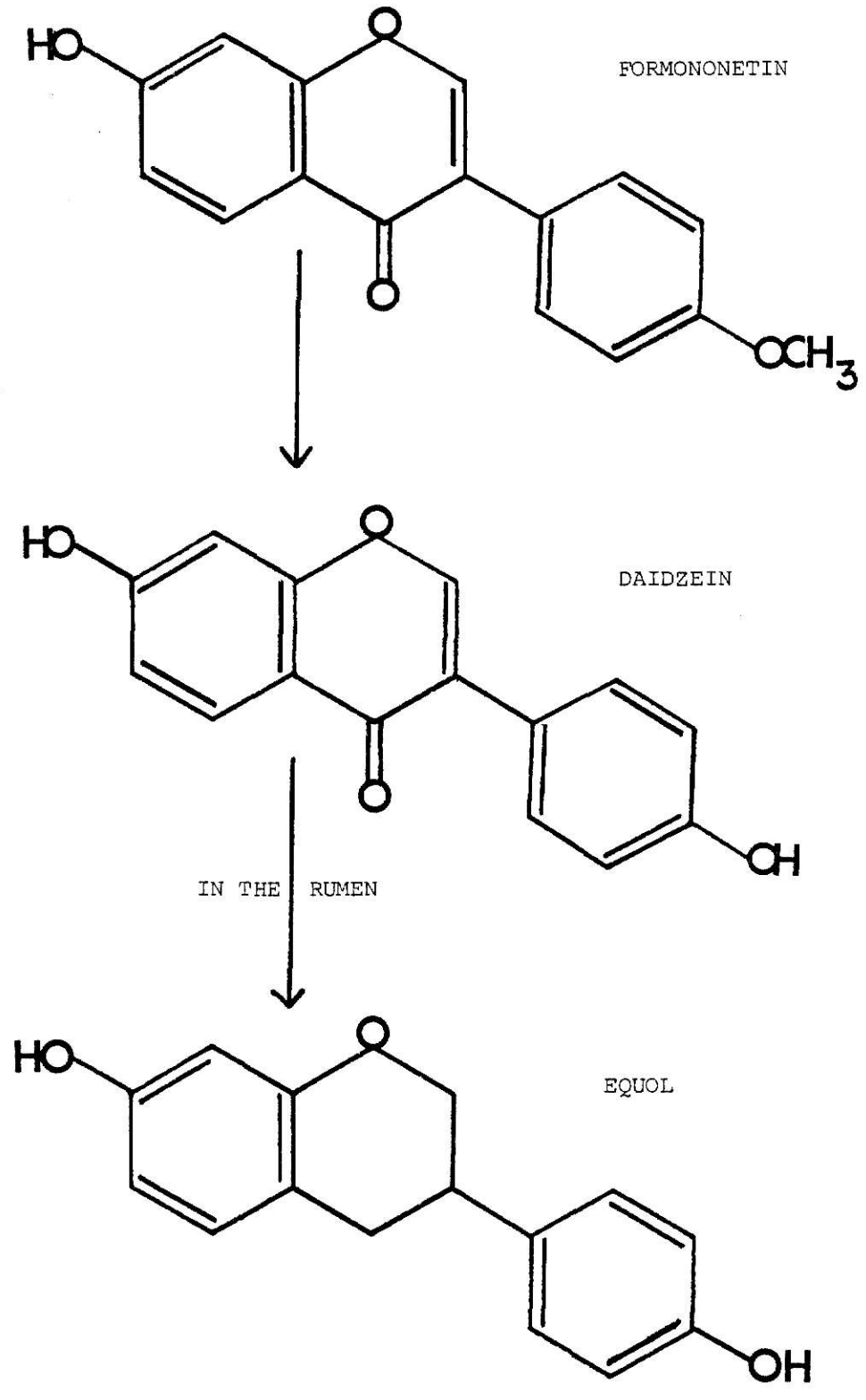

FIGURE 1. Structure and metabolism of formononetin, daidzein and equol. (Matches, 1972)

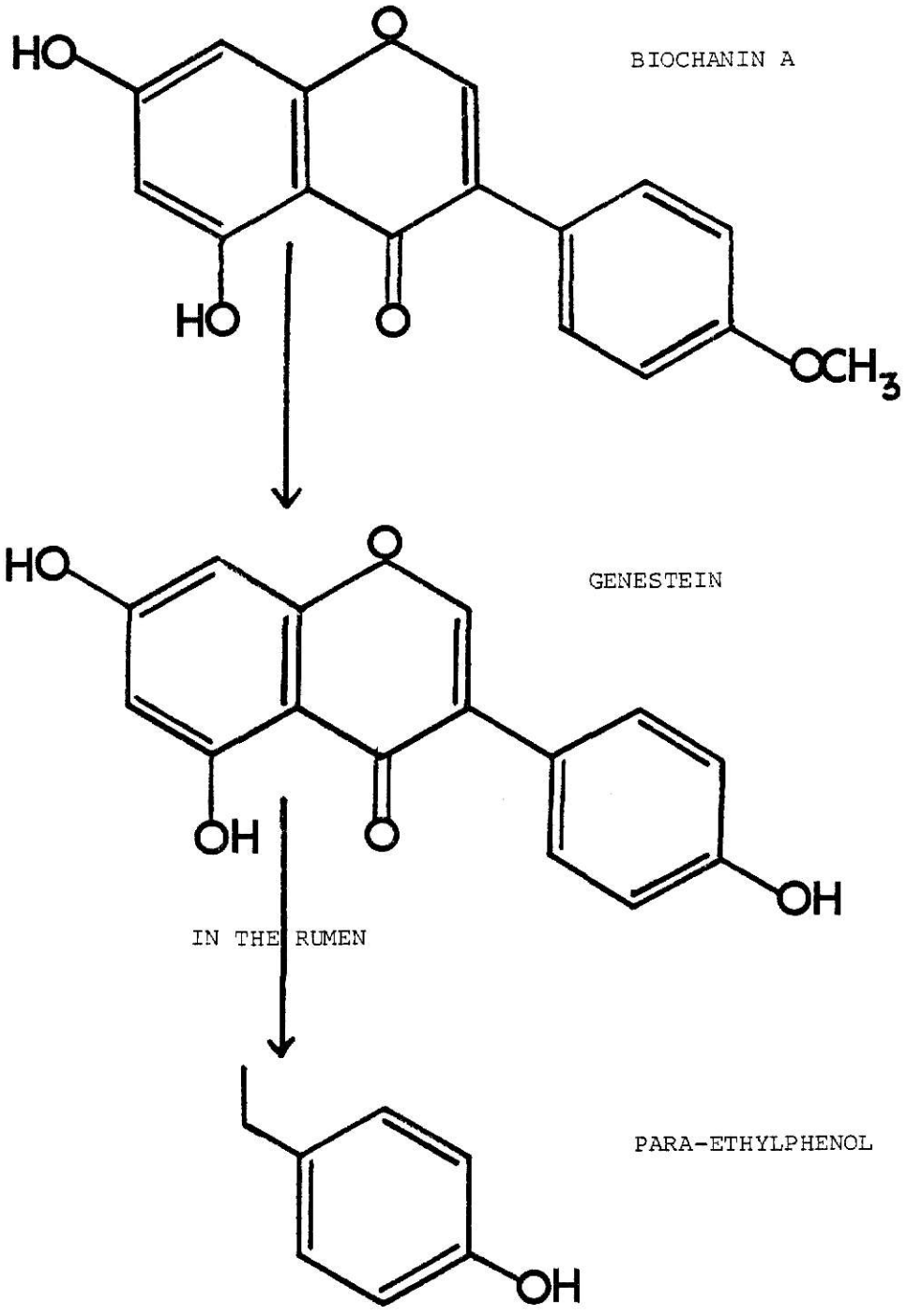

FIGURE 2. Structure and metabolism of biochanin A, genestein and para-ethylphenol. (Matches, 1972)

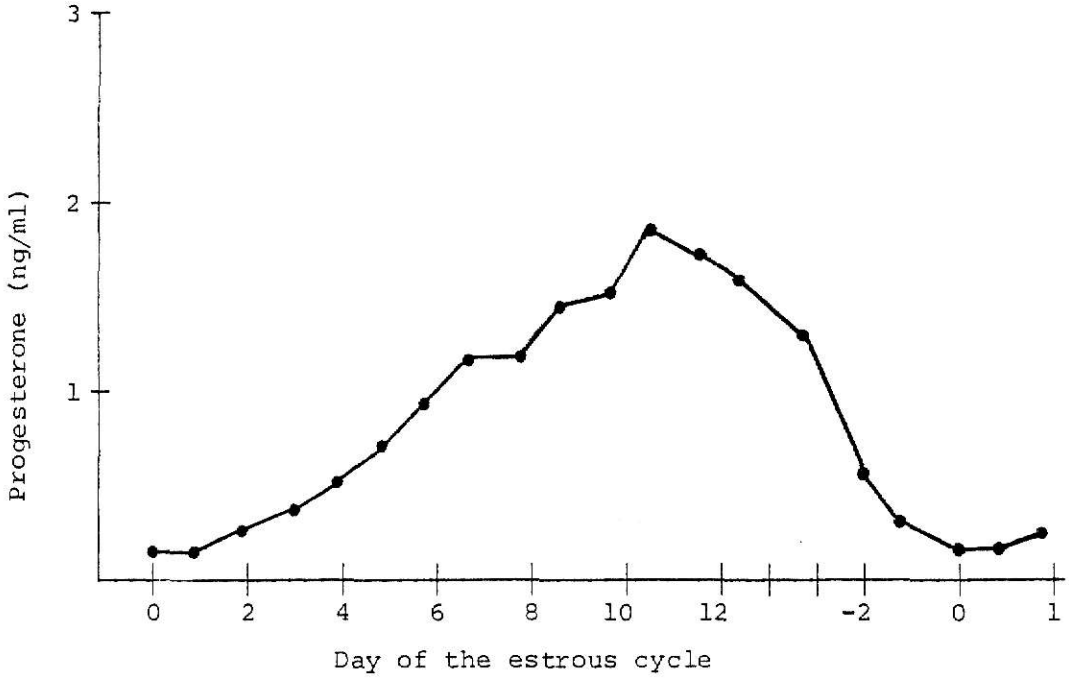

FIGURE 2. Mean progesterone concentrations in the peripheral plasma of the ewe during the estrous cycle. (Thornburn et al. 1969)

SUMMARY

Reproductive performance was measured in ewes grazing birdsfoot trefoil-smooth bromegrass, alfalfa-smoth bromegrass and N fertilized smooth bromegrass pastures in two consecutive spring studies. No differences were seen among treatment groups in conception rate or average conception date in either study. The number of ewes mounted by rams was lower and occurred later among ewes grazing BFT-Br in Trial 1. None of the ewes in Trial 1 were experiencing normal, cyclic estroual activity. There was no treatment effect in Trial 2.

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THE REPRODUCTIVE PERFORMANCE OF EWES GRAZING BIRDSFOOT TREFOIL-SMOOTH BROMEGRASS, ALFALFA-SMOOTH BROMEGRASS AND N FERTILIZED SMOOTH BROMEGRASS PASTURES

by

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AN ABSTRACT OF A MASTER'S THESIS

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Reproductive performance was measured in ewes grazing birdsfoot trefoil-smooth bromegrass, alfalfa-smooth bromegrass and N fertilized smooth bromegrass pastures. The study consisted of two trials: (1) 20 fallborn Dorset x Rambouillet ewe lambs weighing approximately 37.5 kg were allocated to each treatment pasture and 11 to drylot control; (2) one year later the same ewes were reallocated to the pasture groups and the drylot group was deleted. Rams fitted with marking devices were penned in drylot with ewes each night, and mounting marks were recorded daily. Blood samples were collected by jugular puncture at three day intervals. Blood Samples from Trial 1 were radioimmunoassayed for progesterone concentration. No differences were seen in average conception date or conception rates among treatment group in either trial. The number of ewes mounted by rams in Trial 1 was lower and occured later among ewes grazing birdsfoot trefoil-smooth bromegrass. No differences in number of ewes marked was seen among treatment groups in Trial 2. Plasma progesterone levels measured in Trial 1 indicate that ewes were not experiencing normal, cyclic estrous cycles, therefore no conclusions can be drawn from the results. No differences due to treatment were observed in Trial 2.