

A Note on the Results of an Attempt to Fertilise Native Goat-Ewes with Sheep-Rams.

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THIS Division occasionally receives letters from farmers reporting progeny from the mating of a female goat and a sheep-ram. However, on making careful enquiries into the accuracy of the information, the observations made by the correspondents have invariably failed to stand critical analysis. Consequently it was decided to conduct an observation during which unquestionable results could be obtained.

MATERIAL AND METHOD.

Ten female goats were placed under observation at the Experimental Station, Nootgedacht, Ermelo, under such conditions that undesired matings were impossible.

Goats 44859, 44860, 44861, 44862 and 44863 were purchased from a local farmer in June, 1935. Goats 45503, 45504, 45505, 45506 and 47127 were also purchased locally in December, 1935. The goats were young, sexually mature animals, in good condition, at the time of purchase.

They were kept under "dry lot" conditions in an unsheltered enclosure, measuring 34 feet by 25 feet, during the entire period of observation, from June, 1935, until September, 1939.

The feed consisted of six ounces of crushed yellow maize and two ounces of cotton seed meal each per day; teff hay and water, from the tap, were always available. This treatment continued from the time of their inclusion in the observations until March, 1939. From March, 1939, until the conclusion of the observations the ration consisted of six ounces of crushed yellow maize, three ounces of wheaten bran, and two pounds of lucerne hay each per day.

The goats were vaccinated against anthrax and blackquarter on 10.4.37, 29.3.38 and 4.5.38, and against bluetongue on 26.9.37 and 9.3.39. They maintained good condition throughout.

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From the time of their arrival on the Station (five on 17.6.35 and five on 17.12.35), until the termination of the observations, they were tested daily for oestrus at 8.30 a.m. Two vasectomised goat-rams were used for this purpose.

OBSERVATIONS AND RESULTS.

No sexual activity was observed until the 8th of February, 1936, when one of the goats, first purchased, showed oestrus. During February, 1936, seven showed oestrus; of the remaining three, one showed oestrus for the first time in April, 1936, one in April, 1937, and one in June, 1937.

During 1936 there was definite seasonal sexual activity extending from February to August. However, one goat continued to show sexual activity throughout the year; two goats did not show oestrus.

During 1937 there was also a tendency for oestrus to be confined to the earlier months of the year, up to August. However, three goats continued to show sexual activity throughout the year at irregular intervals; three goats showed only a single oestrus.

During 1938 oestrus was confined to the months January to August. One goat showed oestrus only once, and four never showed sexual activity.

During 1939 oestrus was again confined to the months January to August; three goats showed oestrus only once during the season.

These observations on the sexual cycle of the native goat would correspond with those of K pfer (1928) in that there was a seasonal sexual activity extending from January to August. K pfer's work, however, was confined to the latter half of the year, 8.7.25 to 15.1.26, and his deductions were made from the fact that he observed lambing in September. A small number of our goats continued to show sexual activity throughout the year at irregular intervals, while all the twenty goats, used by K pfer, were in anoestrus from August 26th, until the 15th of January following.

The observations were terminated in September, 1939, and eight goats that remained in the experiment during the whole period were slaughtered for examination of the genitalia between 8.9.39. and 20.10.39. Goat No. 44861 died on 14.3.39, and No. 45505 on 7.8.38. Notes on the examination of the genital organs are recorded in Appendix I.

The goats showing oestrus were mated with sheep-rams trained to "hand-service". In the majority of cases the rams mated readily with the goat ewes. In a few cases, where mating was refused by the rams, artificial insemination was adopted, the semen being obtained from a sheep-ewe following normal copulation. When oestrus was observed on two successive days mating was allowed on both days.

Eleven rams of known high fertility were used for matings.

Appendix 2 shows, in summarised form, the various details recorded regarding the dates of the appearance of oestrus, the total number of oestrous periods, the number of services or artificial inseminations, the oestrous periods at which no service could be obtained from the rams, the ram used at each mating, the dates of abortion, and the dates of slaughter.

Table 1 shows the genital history of the ewes during the four seasons they were under observation.

TABLE 1.

No. of Ewe.	Date of Inclusion in Experiment.	Year.	First Oestrus (Date).	Last Oestrus (Date).	Dioestrous Periods in Days (Successive Periods).	Total.	Number of Times Mated or Artificially Inseminated.	Number of Pregnancies Established.
44859.....	17. 6.35	1936	Feb. 8th	May 22nd	21, 21, 62, 242.....	4	4	0
		1937	Jan. 19th	Nov. 29th	22, 10, 46, 20, 216, 42.....	6	4	0
		1938	Jan. 10th	Aug. 13th	48, 63, 41, 21, 20, 21, 175.....	7	8	0
44860.....	17. 6.35	1939	Feb. 4th	May 25th	5, 36, 12, 21, 22, 13.....	6	7	0
		1936	Feb. 14th	Jun. 1st	20, 36, 52.....	3	4	0
		1937	Apr. 13th	May 15th	316, 32.....	2	2	0
		1938	Apr. 28th	May 15th	289, 52, 43, 43, 11.....	5	6	1
		1939	Feb. 6th	Jul. 12th	193, 68, 21, 22, 44.....	5	5	0
44861.....	17. 6.35	1936	Feb. 11th	May 8th	21, 24, 42.....	3	4	0
		1937	May 15th	May —	372.....	1	1	0
		1938	Jan. 9th	Feb. 28th	239, 50.....	2	2	0
44862.....	17. 6.35	1939	—	Feb. 28th († 14.3.39)	—	—	—	—
		1936	Feb. 17th	May 7th	59, 21.....	2	3	0
		1937	Jan. 23rd	Dec. 4th	216, 21, 29, 21, 121, 44, 148.....	7	5	0
		1938	Feb. 21st	Aug. 14th	79, 173.....	2	3	0
44863.....	17. 6.35	1939	Jan. 27th	May 4th	166, 13, 21, 21, 41.....	5	5	1
		1936	Feb. 14th	Aug. 4th	20, 41, 34, 77.....	4	5	1
		1937	Aug. 7th	Aug. 7th	232, 55, 7, 11, 21, 42.....	6	5	0
		1938	Mar. 2nd	Aug. 14th	207, 46, 64, 55.....	4	4	0
45503.....	17.12.35	1939	Apr. 20th	Jul. 27th	249, 97.....	2	3	0
		1936	Feb. 10th	Dec. 14th	6, 64, 58, 17, 78, 48, 37.....	7	5	0
		1937	Jan. 19th	Nov. 27th	36, 57, 22, 15, 41, 28, 26, 123.....	8	7	0
		1938	Feb. 28th	—	93.....	1	1	0
45504.....	17.12.35	1939	Apr. 8th	—	404.....	1	1	0
		1936	Apr. 25th	—	82.....	1	2	1
		1937	Apr. 13th	—	271.....	1	1	0
		1938	—	—	—	0	0	0
45505.....	17.12.35	1939	Jan. 29th	—	652.....	1	1	0
		1936	Feb. 20th	—	55, 67, 34.....	3	3	1
		1937	Jun. 25th	—	335.....	1	1	0
		1938	—	—	—	0	0	0
45506.....	17.12.35	1939	—	—	—	—	—	—
		1936	—	—	—	0	0	0
		1937	Jun. 5th	—	—	0	1	0
		1938	—	—	—	0	0	0
47127.....	17.12.35	1939	Jul. 26th	Aug. 17th	782, 22.....	2	2	0
		1936	—	—	—	0	0	0
		1937	Apr. 13th	Apr. 23rd	10.....	1	2	0
		1938	—	—	—	0	0	0
		1939	Apr. 15th	—	722.....	1	1	0

NOTE.—Some goats were served more than once during oestrus; some were not served because the rams would not mate.

The irregularity of the duration of dioestrus is remarkable. Only a relatively small percentage of oestrous cycles conformed to K pfer's normal cycle, for the native goat in South Africa, of 20 to 22 days. The reason for such irregularity is not clear. It may have been due to the environmental conditions under which the ewes were maintained, or it may be that they became impregnated, the pregnancy being followed by embryonic death and foetal absorption.

Goat 44860 showed a haemorrhagic discharge from the vulva on 23.9.38, following a mating on 28.7.38. The tail and hindquarters were bloodstained, but no foetal membranes were found in the vagina or the enclosure. However, it would be difficult to find such a young embryo under the existing conditions. Goat 44862, which was slaughtered on 6.10.39, had been pregnant from a service on 4.5.39, but the foetus had died and had undergone maceration.

Goat 45504 expelled foetal membranes on 3.7.36, after a mating on 25.4.36, but there was no trace of a foetus in the enclosure.

Goat 45505 expelled foetal membranes on 17.11.36, after a last mating on 25.4.36, but no foetus was found.

The goats which aborted were tested for contagious abortion and malta fever with negative results.

It is apparent that four of the ewes became fertilized; three of these aborted, while the foetus of the other died and underwent maceration. In the case of the abortions no foetus was found. It is unlikely that any further abortions took place and were not noticed, as the ewes were kept under very careful observation. However, the possibility of fertilisation, followed by embryonic death and absorption, is not excluded. In fact the irregular and long dioestrous periods experienced by all the ewes would lend substance to such a possibility. However, there is no definite proof of such pregnancies.

These results correspond with those of Warwick, Berry and Horlacher (1932, 1933), who worked with Angora goats. However, our native ewes would appear to be more difficult to impregnate than the Angoras. Out of ten native goats used only four became visibly fertilised during four breeding seasons; of these, three aborted at 57, 69 and 115 days, while the fourth had a macerated foetus in the uterus when slaughtered 155 days after the last mating. Warwick, Berry and Horlacher (1932, 1933) mated eight Angora ewes during one mating season and obtained five certain pregnancies. During the following season they mated twenty-four Angora ewes at one or more oestrous periods and obtained thirteen certain pregnancies. In every case there was an abortion or foetal absorption. No living young were born, the pregnancy terminated prior to the end of the normal gestation period. Mumford (1923) states that the cross between the sheep and goat has been successful in a number of instances. No details are given as to how mating was done. Spillman (1913) reports a case of a sheep-goat hybrid, a female, which appeared to be infertile, although a half-grown foetus was once produced. In Spillman's case, however, it must be noted that the hybrid was born as a twin to a lamb that was not a hybrid.

SUMMARY.

(1) Ten female native goats were mated to, or artificially inseminated with semen from a number of highly fertile sheep-rams during four breeding seasons.

(2) There was great difficulty in obtaining fertilisation, but four of the ewes became pregnant; of these three aborted, while the foetus of the other died and underwent maceration. The pregnancy in each case terminated before the end of the normal gestation period.

(3) The possibility of fertilisation occurring, followed by embryonic death and abortion, is not excluded. In fact it is supported by the irregular and long dioestrous periods experienced by the ewes.

(4) Sexual activity was usually confined to the months January to August, but in a few cases oestrus appeared at irregular intervals throughout the year.

(5) At death or slaughter, during the usual anoestrous season, seven of the ewes showed ovarian inactivity, two showed hydrometra and one showed foetal maceration.

LITERATURE.

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APPENDIX I.

Notes on the Post-mortem Examination of the Genitalia.

No. 44859: Slaughtered 8.9.39. Weight, 87.0 lb. The uterus is non-pregnant. The entire genital tract is normal. The state of the ovaries is inactive, and the indications are that ovulation has not taken place for some time.

NOTE.—The ewe last showed oestrus on 25.6.38, and was mated.

No. 44860: Slaughtered 8.9.39. Weight, 113.0 lb. The uterus is non-pregnant. The entire genital tract is normal. The state of the ovaries is inactive, and there are no indications of recent ovulation.

NOTE.—The ewe last showed oestrus on 12.7.39, and was mated.

No. 44861: Died of broncho-pneumonia 14.3.39. The uterus is non-pregnant. The entire genital tract is normal. Both ovaries are inactive, and there are no indications of recent ovulation.

NOTE.—The ewe last showed oestrus on 28.2.38, and was mated.

No. 44862: Slaughtered 6.10.39. Weight, 94 lb. The uterus is enlarged and fluctuating. It contains 200 c.c. of a thick, brown, purulent material mixed with shreds of mucous membrane and pieces of a decomposed foetus. The maternal and foetal cotyledons are necrotic. The right and left ovaries show a large corpus luteum of pregnancy. The cervix contains a brownish, thick, tenacious material.

NOTE.—The ewe showed oestrus on 4.5.39, and was mated. She was apparently fertilised, but the foetus died and underwent maceration.

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No. 44863: Slaughtered 20.10.39. Weight, 78.0 lb. The uterus is non-pregnant. The entire genital tract is normal. The ovaries are inactive, and there is no evidence of a recent ovulation.

NOTE.—The ewe showed oestrus last on 27.7.39, and was mated.

No. 45503: Slaughtered 15.9.39. Weight, 134 lb. The uterus is non-pregnant. It is enlarged and slightly fluctuating. It contains about 25 c.c. of clear, transparent fluid. There is evidence of commencing hydrometra. The cervix contains a thick, sticky, mucous material. The vagina contains a small amount of mucus. The right ovary shows two yellowish-brown corpora lutea, 0.6 mm. in diameter. The left ovary shows several (12) immature Graafian follicles.

NOTE.—The ewe last showed oestrus on 8.4.39, and was mated.

No. 45504: Slaughtered 22.9.39. Weight, 104 lb. The uterus is enlarged and fluctuating. It contains about 15 c.c. of fluid in each horn. The walls are thin and almost transparent. The fluid is watery and transparent, and contains some small flocculi. There appears to be degeneration of the uterine mucosa. There are some cotyledonary buds present towards the pars indivisa. The left ovary contains a corpus luteum about 10 mm. in diameter. The right ovary shows a few immature Graafian follicles. The uterus shows hydrometra and degeneration of the mucosa.

NOTE.—The ewe last showed oestrus on 29.1.39 and was mated.

No. 45505: Died 7.8.38. The uterus is non-pregnant. The entire genital tract is normal. The ovaries are inactive, and there is no evidence of a recent ovulation.

NOTE.—The ewe last showed oestrus on 25.6.37, and was artificially inseminated.

No. 45506: Slaughtered 29.9.39. Weight, 101.0 lb. The uterus is non-pregnant. The entire genital tract is normal. The left ovary contains a corpus luteum, about 3 mm. in diameter, apparently resulting from the ovulation of the last oestrus, 43 days previously.

NOTE.—The ewe showed oestrus on 17.8.39, and was mated.

No. 47127: Slaughtered 14.10.39. Weight, 80 lb. The uterus is non-pregnant. The entire genital tract is normal. The ovaries are inactive and show no evidence of a recent ovulation.

NOTE.—The ewe last showed oestrus on 15.4.39 and was mated.

APPENDIX II.

Goat No.	Oestrous Observations and Service Data.
44859	8-2-36 (S.); 29-2-36 (S.); 21-3-36 (S.); 22-5-36 (S.); 19-1-37 (N.S.); 10-2-37 (N.S.); 20-2-37 (S.); 7-4-37 (A.I.); 27-4-37 (S.); 29-11-37 (S, Ram No. 50956); 10-1-38 (S, Ram 50956); 27-2-38 (S, Ram 38568); 1-5-38 (S, Ram 41222); 11-6-38 (S, Ram 41223); 2-7-38 (S, Ram 50956); 22-7-38 (S, Ram 41223); 12-8-38 (S, Ram 50956); 13-8-38 (S, a.m., Ram 47349 and p.m., Ram 41223); 4-2-39 (S, a.m., Ram 47348 and Ram 53357 and p.m., Ram 47348); 5-2-39 (S, Ram 47348); 10-2-39 (S, a.m., Ram 41223 and p.m., Ram 41223); 18-3-39 (S, Ram 53311); 30-3-39 (S, a.m., Rams 47348 and 41222 and p.m., Ram 47348); 20-4-39 (S, Ram 41222); 12-5-39 (S, Ram 41223); 25-5-39 (S, a.m., Ram 53478 and p.m., Ram 53478). Slaughtered 8-9-39; not pregnant.
44860	14-2-36 (S.); 5-3-36 (S.); 10-4-36 (S.); 1-6-36 (S.); 13-4-37 (A.I.); 15-5-37 (S.); 28-2-38 (S, Ram 38568); 21-4-38 (S, Ram 41222); 3-6-38 (S, Ram 41223); 16-7-38 (S, Ram 59955); 27-7-38 (S, Ram 41223); 28-7-38 (S, Ram 41223); 6-2-39 (S, a.m., Ram 53311 and p.m., Ram 53311); 15-4-38 (S, Ram 53311); 6-5-39 (S, a.m., Ram 41222 and p.m., Ram 41222); 7-5-39 (S, Ram 41223); 29-5-39 (S, a.m., Ram 53478 and p.m., Ram 53478); 12-7-39 (S, Ram 53478). Slaughtered 8-9-39; not pregnant.
44861	11-2-36 (S.); 3-3-36 (S.); 27-3-36 (S.); 8-5-36 (S.); 15-5-37 (S, Ram 50956); 9-1-38 (S.); 28-2-38 (S, Ram 47348). Died 14-3-39; non-pregnant.
44862	17-2-36 (S.); 16-4-36 (S.); 7-5-36 (S.); 23-1-37 (S.); 13-2-37 (S.); 14-4-37 (A.I.); 5-5-37 (N.S.); 26-5-37 (S.); 9-7-37 (N.S.); 4-12-37 (S, Ram 50956); 21-2-38 (S, Ram 50956); 13-8-38 (S, a.m., Ram 47348 and p.m., Ram 41223); 14-8-38 (S, a.m., Ram 41223 and p.m., Ram 41223); 27-1-39 (S, a.m., Rams 47348 and 29221, and p.m., Rams 47348 and 29221); 9-2-39 (S, a.m., Rams 47348 and 41222, and p.m., Ram 47348); 2-3-39 (S, Ram 53311); 23-3-39 (S, a.m., Ram 47348 and p.m., Ram 47348); 3-5-39 (S, a.m., Ram 41222 and p.m., Ram 41222); 4-5-39 (S, Ram 41222). Slaughtered 6-10-39; macerated foetus in uterus.
44863	14-2-36 (S.); 5-3-36 (S.); 15-4-36 (S.); 19-5-36 (S.); 4-8-36 (S.); 24-3-37 (S.); 18-5-37 (S.); 25-5-37 (S.); 5-6-37 (S.); 26-6-37 (N.S.); 7-8-37 (S.); 2-3-38 (S, Ram 41222); 17-4-38 (S, Ram 38568); 20-6-38 (S, Ram 50956); 14-8-38 (S, a.m., Ram 41223 and p.m., Ram 47348); 20-4-39 (S, Ram 47348); 21-4-39 (S, Ram 41222); 27-7-39 (S, Ram 53478). Slaughtered 20-10-39; not pregnant.
45503	10-2-36 (S.); 16-2-36 (S.); 20-4-36 (N.S.); 17-6-36 (N.S.); 4-7-36 (N.S.); 20-9-36 (S.); 7-11-36 (S.); 14-12-36 (S.); 19-1-37 (A.I.); 17-3-37 (A.I.); 8-4-37 (A.I.); 24-4-37 (A.I.); 3-6-37 (S.); 1-7-37 (S.); 27-7-37 (N.S.); 27-11-37 (S, Ram 38568); 28-2-38 (S, Ram 38568); 8-4-39 (S, Ram 53311). Slaughtered 15-9-39; not pregnant.
45504	25-4-36 (S.); expelled foetal membranes on 3-7-36; 16-7-36 (S.); 13-4-37 (S.); 1938, no oestrus; 29-1-39 (S, Ram 47348). Slaughtered 22-9-39; not pregnant.
45505	20-2-36 (S.); 15-4-36 (S.); 21-6-36 (N.S.); 25-7-36 (S.); aborted 17-11-36; 25-6-37 (A.I.). Died 7-8-38; not pregnant.
45506	5-6-37 (S.); 26-7-39 (S, Ram 53478); 17-8-39 (S, Ram 53357). Slaughtered 29-9-39; not pregnant.
47127	13-4-37 (S.); 23-4-37 (A.I.); 15-4-39 (S, Ram 41223). Slaughtered 14-10-39; not pregnant.

NOTE.—(1) S. indicates that the ewe was mated normally.
 (2) N.S. indicates that the ewe was not mated because the ram would not copulate.
 (3) A.I. indicates that the ewe was artificially inseminated.
 (4) Breeds of rams used :—

Nos. 38568, 41222, 41223 : Corriedale.
 Nos. 47348, 47349, 29221, 53351 : Merino.
 Nos. 50956, 53311, 59955 : Dorset Horn.
 No. 53478 : South Down.