Table 1.—Comparative Lambing Dates of Untreated Ewes and Ewes Treated with Various Hormone Preparations.

Experimental groups			Treatments—Hormones used: Gonadotropic			Natural-Estrogenic			Synthetic-Stilbesterol			No treatment		
Flock No.	No. of sheep	Type and age of sheep	No. in group	Average lambing date*	Number left to lamb**	No. in group	Average lambing date*	Number left to lamb**	No. in group	Average lambing date*	Number left to lamb**	No. in group	Average lambing date*	Number left to lamb**
1	62	Fine—yr.	21	Dec. 20	7	21	Dec. 20	3				20	Jan. 3	3
2	59	Fine—yr.	20	Nov. 26	0	20	Dec. 24	5				19	Dec. 1	0
3	120	Fine—mature	40	Nov. 24	4	20	Dec. 4	11	20	Dec. 5	6	40	Dec. 1	7
4	76	N.West—2 yr.	34	Dec. 20	2	17	Jan. 6	6				25	Dec. 13	1
5	203	N.West—3 yr.	53	Dec. 6	7	50	Dec. 26	20	50	Dec. 1	10	50	Dec. 3	5
6	331	Fine—6 yr.	50	Nov. 22	12	90	Dec. 9	50	90	Nov. 28	17	101	Nov. 25	7
7	78	Fine—3 yr.	31	Nov. 27	3	20	Dec. 13	7	6	Nov. 20	3	21	Nov. 23	0
8	24	Fine—mature	15	Dec. 14	2							9	Dec. 20	0
All	953		264	Dec. 3	37	238	Dec. 17	102	166	Nov. 30	36	285	Dec. 1	23

* Includes all ewes lambing up to February 1.

** Includes all ewes remaining to lamb after February 1.

influence upon Kansas sheepmen, an extensive study under controlled conditions was carried out in a number of co-operators' flocks here in Kansas.

Experimental Procedure

Approximately 1000 commercial ewes of different ages and types, and 400 purebred ewes of three different breeds, were included in the study. Three hormone preparations available on the market and similar to others being offered for sale were used. One of these was a gonadotropic hormone prepared from dried sheep pituitaries; another was a synthetic estrogenic (or heat producing) hormone known as Stilbesterol; and the third product used was a naturally-occurring estrogenic material obtained from pregnancy urine. Different groups of ewes in each flock were given these preparations during the early part of June, 1951, and their subsequent breeding and lambing dates compared with groups within each flock that were untreated. The accompanying table gives the results of the study on the commercial ewes.

Results

1. The two estrogenic hormones generally produced heat or estrual periods following injection, but the ewes commonly did not settle during this artificial heat period.
2. Only a small percentage of the ewes injected with the gonadotropic material came into heat following injection, but a large proportion of those that came into heat conceived following breeding during this period. The exact percentage responding to treatment could not be checked accurately because some of the ewes were breeding normally with or without injection during this period.
3. The hormones generally failed to produce earlier or more uniform lamb crops, and one of the hormones used apparently interfered with normal reproductive activities and produced a later and less uniform lamb crop than was obtained from the uninjected ewes.

Project Commercial 108: Salt Research with Feeder Lambs

(Chemical and Physiological Studies)

E. L. Hix, T. D. Bell, D. B. Parrish, and A. L. Good

The consumption of salt by herbivorous animals in general, and their apparent relish for salt, have been recognized for many years, but its importance may be questioned by many because of lack of knowledge of both the practical and fundamental aspects. It is commonly believed that the large amounts of potassium in feeds are antagonistic to the animal's body sodium, and this potassium causes an excretion or loss of sodium which may be adequately replaced only by practical salt (NaC1) supplementation of the feed or ration. However, this belief has not been established conclusively in all of its elaborations designed to explain why these herbivorous animals require supplemental salt.

The following summary is the result of studies with feeder lambs designed to (a) determine the influence of supplementary salt on feedlot performance; (b) study the effect of dietary sodium to potassium ratio on performance, feed digestibility, balance of minerals (Na,K,C1), and physiologic blood plasma constituents as they are functionally related to the water compartments of the animal's body, and (c) ascertain the existence and extent of sodium-potassium antagonism.

Experimental Procedure

In a single feeding trial, 50 feeder lambs were divided unequally into four lots. All lots received a basal ration of corn and alfalfa hay.

Table 1.—Digestibility of Corn-Alfalfa Ration by Wether Lambs. Each Lot Average of Three Lambs.

Lot No.	Experimental treatment	Na:K ratio	Average coefficient of digestibility: Dry matter	Crude protein	Ether extract	Crude fiber	NFE	Ash	Index coefficient
1	$KHCO_3$	1:82	75	70	55	46	87	59	65
2	$NaHCO_3$	1:2	76	72	59	45	88	64	67
3	NaCl	1:2	77	74	63	49	88	64	69
4	Basal	1:45	75	70	59	46	87	60	66

Table 2.—Physiologic Blood Plasma Constituents of Wether Lambs. Each Lot Average of Three Lambs.

Lot No.	Na:K ratio	CO_2 vol. %	NPN mg %	CHON Gms %	Hb Gms %	Ca++ mg %	P+++++ mg %	Mg++ mg %	Na+ mg %	Cl− mg %
1	1:82	58.3	28.5	6.54	12.0	12.7	6.2	1.83	339	356
2	1:2	54.0	31.9	6.98	13.3	12.7	7.3	1.75	354	372
3	1:2	52.0	31.7	6.45	13.0	12.5	7.4	1.89	354	388
4	1:45	46.7	32.2	6.42	12.4	13.3	6.8	2.05	352	385

In addition to the basal ration, Lot 1 received 32.3 gms of potassium bicarbonate ($KHCO_3$), adjusting the Na:K ratio to 1:82; Lot 2, 30.3 gms of sodium bicarbonate ($NaHCO_3$), adjusting the Na:K ratio to 1:2; Lot 3, salt (NaCl) ad lib (21 gms daily), adjusting the Na:K ratio to 1:2; and Lot 4, basal ration only, the Na:K ratio being 1:45.

After a feeding period of 96 days, three wether lambs from each of the four lots (total of 12 lambs) were placed in metabolism stanchions for 21 days for the mineral balance and digestibility determinations. On the last day of the balance, blood samples were taken and analyzed for carbon dioxide (CO_2 or alkali reserve), non-protein-nitrogen (NPN), protein (CHON), hemoglobin (Hb), and the minerals calcium (Ca++), phosphorus (P+++++), magnesium (Mg++), sodium (Na+), potassium (K+), and chloride (Cl-).

On the same day the Na:K ratios in Lots 2 and 4 were changed to 1:82 (formerly 1:2) and 1:2 (formerly 1:45) respectively, for the antagonism study. The antagonism was studied for seven days.

Results

The feed-lot performance was tentatively summarized in the "38th Annual Livestock Feeders' Day." The differences in digestibility are indicated in Table 1, and changes in blood plasma constituents in Table 2.

1. Mineral balance: lambs receiving the basal ration only (Na:K-1:45), and those receiving $KHCO_3$ (Na:K = 1:82), were in negative balance, the daily losses of body sodium being 53 and 22 mg respectively. The quantitative sodium intake was equal in these two lots and the excretion of sodium appears to be a function of the Na:K ratio.
2. Lambs in negative sodium balance retained considerably more potassium than did animals receiving salt or sodium bicarbonate.
3. Excessive sodium excretion leads to potassium retention; and as the dietary sodium: potassium ratio grows progressively wider (from 1:45 to 1:82), sodium excretion increases directly.
4. Sodium; potassium antagonism definitely exists, but it may subsidize to small negative or positive sodium balances after a three-day period.
5. Withholding salt depletes the animal's body sodium through promoting Na:K antagonism, and possibly by not supplying adequate dietary sodium. It also lowers the digestibility of all nutrient components of the feed by 3 to 4 percent. The alkali reserve, or the animal's ability to neutralize nutritional acids, is also reduced.
6. Lambs on the widest Na:K ratio (1:82) performed poorly, showed less digestibility of feed, and showed significantly lower sodium and chloride levels of blood plasma; their bodies were dehydrated by approximately 4 percent.

Project 286: Improvement of Beef Cattle Through Breeding Methods

Walter Smith, Ed Smith, H. L. Ibsen, and Lewis Holland

The purebred Shorthorn herd maintained at Manhattan is being used as a primary basis for the purebred cattle breeding investigations which started at the Kansas station three years ago. The project is still in its preliminary stages, and the systems of breeding which have been adopted were regulated primarily by the pedigrees of the foundation females in the original college herd.

The project has been designed to facilitate the collection of production data which will be used to devise testing and breeding procedures