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DIVISION OF CHEMISTRY

FEEDING VALUES OF CERTAIN
FEEDING STUFFS



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FEEDING VALUES OF CERTAIN FEEDING STUFFS

BY

G. S. FRAPS, PH. D., CHIEF, DIVISION OF CHEMISTRY; STATE CHEMIST

The value of feeding stuffs for feeding purposes depends upon several things. These include its bulk, its palatability, its ash contents, its suitability to the animal, its vitamine contents, its digestible protein and its productive value. The most important of these from the standpoint of animal nutrition are the digestible protein and the productive value.

DEFINITION OF TERMS

Digestible protein.—Protein is the constituent of the feed which is used to form lean meat, muscle, skin, hair, and similar portions of the body, secretions of the body which are necessary for life, and to replace and repair animal tissue. The protein is equal to nitrogen multiplied by 6.25.

The digestible protein is that which is digested and absorbed during the passage of the food through the animal's body. The digestible protein represents the capacity of the food to furnish material for the production of lean meat, or for the repair or replacement of the tissue of the animal body.

It is made up of a variety of constituents and varies in character in the different feeding stuffs. In the same feeding stuff there are usually several different kinds of chemical compounds in the protein. The proteins of some feeding stuffs appear to lack part of the essential constituents for the proper replacement or the repair of the animal tissues, and for this reason are not as effective as they should be. The investigations along this line are not yet sufficiently definite to permit satisfactory statements with regard to the qualities of different protein constituents in feeding stuffs.

Productive value.—Productive value means the ability of the feeding stuff to furnish the material for heat, for work or for the production of fat. Protein, when digested, may be burned for the production of heat, or energy, or its nitrogen may be spilt off and the residues used for the formation of fat. Fats, when digested, may likewise be used for heat or energy, or may be stored up for fat. The same is true of the constituents of the nitrogen-free extract and of the protein of the crude fiber which is digested.

The work of digestion consumes a certain amount of energy which

must be furnished from that of the feed digested. Energy is also used for metabolic changes consequent on the digestion of the food. The energy left after these uses are provided for may be used for productive purposes and this is what is termed the productive value of a feeding stuff. It is the value of a feed for the purpose of producing fat, after all the requirements consequent on the consumption of the food have been deducted. The fat may be burned for heat or used for work, or for material production of fat or milk.

Feeding stuffs vary considerably in the amount of loss in the processes consequent upon digestion. For example, the digested constituents of high grade cottonseed meal have a full value for the production of fat, but the digested constituents of wheat straw have only one-fifth the value, pound for pound, of those of cottonseed meal. Feeding stuffs high in crude fiber suffer a great loss in digestion, and the productive value is consequently lowered.

The productive value is calculated from the results of tests with various feeds, in which the animal is first fed a measured ration sufficient to form a little fat and the quantity of fat determined. Then the animal is fed the same ration with the addition of the feed to be studied, and the quantity of fat produced again measured. The additional quantity of fat produced is due to the addition of the feed to be studied and represents its fat producing power. The productive value may be studied in terms of matter, such as fat, or in terms of energy, such as therms.

Ash of feeding stuffs is particularly important in growing animals, as it is necessary for the formation of bones, and certain portions of it are also required for the blood.

Vitamines are substances which are believed essential in the life of the animal, some of which appear to be absent from highly-milled materials or from their by-products. For example, they are not present in polished rice. They are, however, present in seeds and in meat, and in the leaves of plants. It is believed there are two different groups, and that one group is present in the seeds and another in the leaves. The relation of the matter to animal feeding requires further investigation. At present the matter appears of significance chiefly in connection with pigs, although it may possibly be important in connection with breeding animals.

DIGESTION EXPERIMENTS

The productive values and the values for the digestible protein in this bulletin have been calculated from the results with digestion experiments on sheep. The method of conducting the experiments is the same as that described in Bulletins No. 147 and 166 of this Station. The production coefficients were calculated as described in Bulletin No. 185. Details of the experiments are given in tables in the back of this bulletin or in connection with the feeds described.

COEFFICIENTS OF DIGESTIBILITY

The coefficients of digestibility are used to calculate the digestible constituents of a feeding stuff, and until about ten or fifteen years ago the digestible nutrients were used exclusively for calculating rations in the feeding of animals. Developments in scientific knowledge concerning feeding stuffs have rendered the use of digestible constituents in feeding stuffs an antiquated method, although many people are still using them. The digestible nutrients do not show the real feeding value of the feeding stuff, for the reason that the nutrients digested are not of equal value to the animal body.

An illustration of this may be given by comparing the digestible nutrients of cottonseed meal and cottonseed hulls. These are given in table 1. The total digestible nutrients of 100 pounds cottonseed meal are 67.6, while for cottonseed hulls they are 35.3. One pound of cottonseed meal would therefore be equal to only 1.9 pounds of cottonseed hulls, based on the digestible nutrients. Any feeder knows that this is not correct, and scientific experiments have shown that it is highly incorrect, as cottonseed meal has a much higher feeding value.

Table 1.—Comparison of digestible matter and productive value.

	Cottonseed Meal	Cottonseed Hulls.
Composition: protein.....	43.2	3.5
Ether extract.....	7.6	0.7
Crude fiber.....	11.3	45.0
Nitrogen-free extract.....	26.0	39.2
Water.....		9.0
Ash.....		2.6
Digestible protein.....	36.7	0.2
Digestible ether extract.....	7.7	0.6
Digestible crude fiber.....	4.2	21.2
Digestible nitrogen-free extract.....	9.5	13.3
Total.....	67.6	35.3
Productive value.....	17.1	4.1

The productive value may be expressed, as is here done, in terms of fat which the feed is capable of producing, or, as expressed by Armsby, in terms of the heat, or energy that it may produce. In either case, the productive value represents more closely the actual feeding value than the sum of the digestible nutrients. For example, the cottonseed meal is given in table 1 as having a productive value of 17.1 and the cottonseed hulls a productive value of 4.1. One pound of cottonseed meal would therefore equal in feeding value 4.2 pounds of cottonseed hulls. This is confirmed by experiments.

The misleading character of the comparison of the digestible nutrients is shown clearly when money values are compared. If the cottonseed hulls sell for \$20 per ton, and the cottonseed meal for \$60 per ton, one pound digestible nutrients in cottonseed meal would cost 4.4 cents and one pound in cottonseed hulls would cost 2.9 cents. Cottonseed hulls are apparently cheaper than cottonseed meal.

But if the cost of the units of productive value are compared, one finds that one pound productive value of cottonseed meal costs 17.2 cents, while one pound productive value of cottonseed hulls costs 24.4. Therefore, the cottonseed hulls at \$20 per ton are much more expensive than the cottonseed meal at \$60 per ton. The comparison of the digestible nutrients of the cottonseed meal and cottonseed hulls have given entirely misleading results. Feeders have not been willing to pay \$20 a ton for cottonseed hulls when the meal was sold at about \$60. If the productive values are correct for feeding purposes, they were right. If the values based on the digestible nutrients are right, they were wrong and should have purchased the hulls. But the values based on the digestible nutrients are not right. If the productive values in the hulls are assumed to be worth 17.2 cents, then the value per ton would be \$14.10. During the past season roughage has sold at prices in excess of its feeding value based upon the productive value, at least in Texas, on account of the scarcity of roughage due to the drouth.

DESCRIPTION OF FEEDS AND DISCUSSION OF RESULTS

The composition of the feeds used and the average composition are shown in table 2, together with digestible protein and the productive value of the feeds. The coefficients of digestibility are given in table 8. Table 9 contains the production of coefficients of the various feeding stuffs. A discussion of the individual feeding stuffs is given below.

Table 2.—Composition and feeding value.

Lab. No.		Protein.	Ether extract.	Crude fiber.	Nitrogen free extract.	Water.	Ash.	Digestible protein.	Productive value.	Reference No.
14855-6	Acorn kernels, dry 71.35 kernel	5.18	9.31	2.23	13.64	7.53	2.11			
	Acorn kernels, Red Oak group	6.91	27.02	9.47	49.06	5.26	2.28			
	Acorn kernels, Post Oak group	6.11	7.91	3.23	74.68	7.75	2.35			
	Acorn kernels, fresh Red Oak group	5.20	20.25	8.43	37.91	26.53	1.68			
	Acorn kernels, fresh Post Oak group	4.27	3.96	2.23	47.91	39.98	1.65			
14865-6	Shells from 14855-6	4.20	1.64	36.38	46.94	8.01	2.83			
	Acorn shells, fresh average	2.80	1.08	21.66	36.93	35.90	1.63			
	Acorn shells, dried average	3.79	1.36	43.77	41.89	6.75	2.44			
14855-6-65-6	Whole acorns, D. E. 104	4.90	7.11	12.01	65.99	7.67	2.32	0	10.71	7
	Acorns, dried, Red Oak group	6.06	20.11	18.73	47.12	5.66	2.32	0	14.15	7
	Acorns, dried, Post Oak group	5.59	6.46	12.28	67.34	5.97	2.36	0	10.53	7
	Acorns, fresh, Red Oak group	3.22	10.65	9.93	24.97	50.00	1.23	0	7.50	
	Acorns, fresh, Post Oak group	2.97	3.43	6.52	35.82	50.00	1.26	0	5.60	7
12601-2	Alfalfa hay, D. E. 84	12.11	1.70	33.93	38.50	6.57	7.19	8.52	8.72	
14954-3	Alfalfa hay, D. E. 88-92	11.38	1.52	38.86	34.09	6.46	7.69	7.33	8.16	
14034-5	Alfalfa hay, D. E. 93-97	12.85	1.63	34.42	37.11	6.82	7.97	9.11	7.88	
	Alfalfa hay average (86)	14.76	1.93	28.42	37.38	9.12	8.39	11.0	8.7	1
14565-6	Bear grass, yucca glauca, D. E. 98	6.73	2.02	38.64	37.38	6.75	8.48	2.42	7.21	
	Bear grass, yucca glauca, average (dry)	7.14	1.98	38.33	38.34	6.01	8.20	2.57	7.32	
	Bear grass, yucca glauca, green	4.04	1.09	20.66	21.34	48.29	4.58	1.40	4.09	
14714-5	Beet pulp, dried, D. E. 100	10.37	.41	21.38	54.99	9.74	3.11	5.74	14.47	
	Beet pulp, dried, average (48)	8.9	0.9	18.9	59.6	8.2	3.5	4.63	15.02	2
	Beet pulp, dried, average (4)	10.08	0.56	21.88	57.32	6.67	3.49	5.24	14.28	4
14853-4	Corn cobs, ground, D. E. 104	2.69	.37	33.53	53.91	7.42	2.08			
14554-5	Corn cobs, ground, D. E. 99	2.85	.33	34.27	53.81	6.83	1.91	0	7.30	
14775-6	Corn cobs, ground, D. E. 101	3.53	.72	32.54	52.78	7.36	3.07	0		
	Corn cobs, ground, average	2.0	0.4	31.8	54.3	10.0	1.5	0	7.38	2
14223-4	Cotton burs (no seed), D. E. 95	7.69	2.11	35.17	38.99	6.41	9.64	2.14	5.02	
	Cotton burs with seed, from gin, average	9.14	2.92	33.69	38.30	8.08	7.87	2.55	5.37	7
12265-6	Cottonseed, heated seed cold pressed, D. E. 89	23.93	18.20	23.72	23.54	6.86	4.75	13.40	15.57	7
	Cottonseed, cold pressed, average (14)	29.37	6.59	24.14	29.83	5.70	4.37		13.94	4
	Cottonseed, cold pressed, average if heated	29.37	6.59	24.14	29.83	5.70	4.37	16.44	12.05	
14837-8	Cottonseed feed No. 4, D. E. 103	40.88	5.94	12.90	27.86	7.57	4.85	35.86	14.34	7
14797-8	Cottonseed feed No. 4, D. E. 102	42.75	6.30	12.25	25.89	7.83	4.98			7
14777-8	Cottonseed feed No. 4, D. E. 101	41.54	6.06	12.48	27.98	6.93	5.01	36.44	14.56	7
	Cottonseed feed No. 4, average (70)	41.84	6.50	12.01	26.92	7.39	5.34	36.71	14.80	4
12376-7	Peanut hulls (commercial) D. E. 90	7.48	1.66	57.24	23.41	7.18	3.03	3.25	2.15	7
	Peanut hulls, no meat, average (16)	6.10	1.29	63.48	16.18	9.03	3.92	3.22	2.72	7
	Peanut hulls, some meat, average (4)	8.16	3.82	55.60	19.11	9.53	3.78	4.31	.80	7

Table 2.—Composition and feeding value—Continued.

Lab. No.		Protein.	Ether extract.	Crude fiber.	Nitrogen free extract.	Water.	Ash.	Digestible protein.	Productive value.	Reference No.
12719-20	Peanut hay, no nuts, D. E. 87.....	9.54	2.66	21.43	45.89	6.91	13.57	6.40	11.02	.....
	Peanut hay, no nuts, average (13).....	9.90	3.54	23.75	44.61	9.61	8.59	6.3	10.7	3
14283-4	Peanut meal, 5 per cent fiber, D. E. 96.....	54.23	9.97	5.01	20.71	5.26	4.82	51.20	22.01	7
12716-7	Prairie hay, D. E. 85-86.....	5.31	2.10	32.67	45.90	6.97	7.05	1.48	5.19	7
	Prairie hay, Texas average (10).....	4.38	2.13	28.97	48.79	8.16	7.57	0.5	7.1	3
14186-7	Rice bran, D. E. 94.....	13.55	13.44	12.58	45.37	7.37	7.69	10.13	16.60	7
	Rice bran, average 52 (1917-18).....	10.58	13.40	14.82	42.54	8.30	10.36	7.91	16.61	4
13192-3	Rice hulls, D. E. 91.....	2.97	.63	40.48	28.60	7.85	19.47	.26	1.93	2
	Rice hulls, average (14).....	3.56	.93	39.05	29.38	8.49	18.59	.32	2.68	5
12508-9	Rhodes grass hay, D. E. 83.....	5.67	1.61	32.08	42.30	7.95	10.39	2.64	9.00	7
	Rhodes grass hay, average.....	5.76	1.56	31.84	43.23	7.57	10.04	2.69	8.68	7
14795-6	Soapweed stem, D. E. 102.....	4.47	1.06	35.44	44.72	8.61	5.70	0.19	5.85	7
14835-6	Spanish moss, D. E. 103.....	4.95	2.40	27.29	47.48	8.62	9.26	0.03	9.06	7
	Spanish moss, dry, average.....	4.10	1.55	24.45	53.87	8.19	7.84	0.02	10.27	7
	Spanish moss, green, average.....	1.98	0.91	12.06	23.12	58.98	2.95	0.01	4.41	7

Acorns

The investigation of the composition and digestibility of acorns was begun at the request of D. T. Griswold of the Extension Service. A number of samples of acorns were collected through his agency, and submitted to analysis, and one digestion experiment was made.

Analyses of the samples of the acorn hulls and kernels are given in tables 2, 3, 4, 5, 6, 7.

The acorn kernels classify into two entirely different groups, as shown by the chemical composition. In one group, containing acorns from the red oak, water oak, blackjack, willow oak, and blue jack, the acorns are rich in fat. In the other group, containing acorns from the shin oak, live oak and post oak, the acorns are low in fat. The fat content of the acorns of the first group is so high that it would be practicable to extract it from them, if the acorns could be secured in sufficient quantities.

Table 3.—Composition of acorn kernels, as dried for analysis.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Water.	Ash.	Per cent of acorns.
12779	Sipe Springs	10.12	31.34	2.15	47.36	6.41	2.62	69.3
12748	Black Jack and Post Oak	9.00	19.08	2.77	47.48	19.67	2.00	76.9
14214	Red Oak, <i>Quercus subra</i>	7.27	20.70	2.59	58.59	3.16	2.69	70.9
14215	Water Oak, <i>Quercus nigra</i>	5.75	26.36	6.16	56.26	3.30	2.17	73.7
14218	Black Jack, <i>Q. manlandica</i> main.	8.07	26.41	11.55	48.37	2.71	2.89	74.8
14220	Water Oak	3.97	27.37	17.88	46.21	2.62	1.95	69.2
14292	Black Jack	5.00	30.24	15.89	42.54	4.68	1.65	70.1
14221	Willow Oak, <i>Q. phillas</i>	5.54	29.77	5.74	54.40	2.06	2.49	72.4
14217	Blue Jack, Sand Jack, <i>Q. brevifolia</i> Sargo	7.49	31.77	15.51	40.37	2.77	2.09	81.4
	Average	6.91	27.02	9.47	49.06	5.26	2.28	73.0
14192	Shin Oak, Bell county	4.08	4.55	3.46	79.97	5.60	2.34	80.9
14193	Live Oak, Bell county	5.48	8.29	2.28	77.73	4.15	2.07	80.3
14194	Live Oak, average, Uvalde Co.	7.06	8.41	2.66	75.06	4.65	2.16	74.2
14219	Post Oak, Fairfield, Texas	7.96	6.79	3.77	74.79	4.20	2.49	80.1
14293	Post Oak (Bitter)	6.88	10.25	4.95	66.69	8.31	2.92	79.7
14855-6	Post Oak, <i>Quercus minor</i>	5.18	9.31	2.23	73.64	7.53	2.11	71.4
	Average	6.11	7.92	3.23	74.65	5.75	2.35	77.7
14208	Acorns, Coryell county	4.16	2.15	3.38	80.64	8.28	1.99	58.9
13175	Average acorns	6.91	0.54	2.58	55.81	31.51	2.62	45.5

Table 4.—Composition of acorn hulls, as dried for analysis.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Water.	Ash.
12780	From 12748	3.07	0.66	49.44	37.43	7.50	1.90
12809	From 12779	2.97	1.57	43.68	40.64	8.42	2.72
13203	From 13175	3.53	0.39	35.09	45.05	13.18	2.76
14196	From 14192	3.54	2.14	48.27	39.41	4.47	2.17
14197	From 14193	4.62	1.85	46.30	40.03	4.51	2.69
14198	From 14194	3.94	2.05	39.55	47.64	4.52	2.30
14209	From 14208	6.25	1.55	29.98	52.21	7.35	2.66
14222	From 14214-21, inc.	2.74	1.21	54.74	36.22	2.94	2.15
14294	From 14291-2-3, inc.	3.06	.61	54.09	33.39	6.57	2.28
14865-6	From 14856-14855	4.20	1.64	36.38	46.94	8.01	2.83
	Average	3.79	1.36	43.77	41.89	6.75	2.44

Table 5.—Composition of fresh acorn kernels.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Water.	Ash.	Per cent. meats.
14192	Shin Oak, Bell county	2.27	2.53	1.92	44.46	47.52	1.30	80.9
14193	Live Oak, Bell county	3.45	5.22	1.43	48.92	39.68	1.30	80.3
14194	Live Oak, Uvalde county	4.69	5.59	1.77	49.89	36.62	1.44	74.2
14219	Post Oak, Quercus minor sargo	5.02	4.28	2.38	47.18	39.57	1.57	80.1
14208	Acorn kernels	1.67	.86	1.35	32.16	63.17	.79	58.9
14293	Post Oak	5.88	8.76	4.23	56.97	51.67	2.49	79.7
13175	Ovencup Acorns	6.91	0.54	2.58	55.81	51.54	2.62	46.0
	Average (7)	4.27	3.96	2.23	47.91	39.98	1.65	71.4

Table 6.—Composition of fresh acorn kernels.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Water.	Ash.	Per cent kernels.
12748	(Black Jack and Red Oak)	9.00	19.08	2.77	47.48	19.67	2.00	76.89
14214	Quercus subra (Red Oak)	4.98	14.18	5.20	40.13	33.67	1.84	70.85
14215	Quercus nigra (Water Oak)	4.67	21.43	5.01	45.73	21.40	1.76	73.70
14218	Q. manlandica main (Black Jack)	4.90	16.03	7.00	29.36	40.96	1.75	74.79
14220	Q. nigra (Water Oak)	2.96	20.38	13.31	34.41	27.49	1.45	69.23
14292	Black Jack	4.65	28.15	14.79	39.58	11.30	1.53	69.80
14221	Q. Phillas, Willow Oak							
14217	Q. brevifolia, Sargo, Blue Jack, Sand Jack	5.30	22.49	10.98	28.59	31.16	1.48	81.42
14216	Red Oak							
	Average (7)	5.20	20.25	8.43	37.91	26.53	1.68	73.8

Table 7.—Composition of fresh acorn hulls.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Water.	Ash.
14196	From 14192 kernels	2.28	1.38	31.13	25.42	38.39	1.40
14197	From 14193 kernels	2.84	1.14	28.48	24.64	41.25	1.65
14198	From 14194 kernels	2.87	1.49	28.83	34.70	30.43	1.68
14209	From 14208	3.41	.85	16.37	28.47	49.45	1.45
	Average	2.80	1.08	21.66	36.93	35.90	1.63

The acorn hulls, as could be expected, are high in crude fiber, and low in protein and fat.

The acorns are variable in water content. Some of them contain as high as sixty per cent. water.

The two groups into which the acorns are divided on account of their fat content are likewise botanically different, one being known as the bitter acorns and the other as the sweet acorns. One group of oaks is rich in tannic acid, and the other is low.

The acorns were used in digestion experiment No. 104, in connection with corn cobs. They were readily eaten by the sheep. The feeding value of the acorn will depend largely upon the class of oak from which the acorns are derived, and the extent to which the acorns have dried out before they are gathered. It also depends to some extent on the

amount of worms present, and the extent of their development, as some lots of acorns received were very rapidly eaten by the worms. The fresh acorns of the red oak group have about eighty-eight per cent. of the value of alfalfa hay, while those of the post oak group have about sixty-five per cent. of the value of alfalfa hay.

Alfalfa Hay

Three samples of alfalfa hay were used in digestion experiments, two of them being used for the purpose of feeding with other feeding stuffs, a preliminary digestion experiment being made in each case. The alfalfa hay used was somewhat low in protein, and high in fiber. It was readily eaten by the sheep. Alfalfa hay has about seventy per cent. of the value of wheat bran.

Bear Grass (Yucca Glauca)

Bear grass (*Yucca glauca*) was used in digestion experiment No. 98. The leaves of this grass are very tough and contain small spines along the edge. Although the sheep were fed on a ration not sufficient to maintain them, they ate only about forty per cent. of the bear grass. The bear grass which was eaten was digested about as well as any other hay or forage plants. Bear grass has a productive coefficient that compares favorably with other hays. But the fact that there is a great waste in feeding this plant, even when chopped up as in our experiments, must be taken into consideration. The plant is very tough when dry.

Beet Pulp

Dry beet pulp was fed alone in digestion experiment No. 100. It was not eaten well, about fifty per cent. being left by the sheep. It also gave rise to some digestion disturbances, or was too laxative in its action. The digested beet pulp has a productive value about twelve per cent. greater than wheat bran and about seventy-five per cent. of that of corn chops.

Corn Cobs

Ground corn cobs were fed alone in digestion experiment No. 99, with cottonseed meal in experiment No. 101, and with acorns in experiment No. 104. It was not eaten well when fed with acorns, although it was eaten well when fed with cottonseed meal.

The corn cobs do not contain any digestible protein, but the digestibility of the crude fiber and of the nitrogen-free extract compare favorably with the digestibility of hays and some other roughages. The feeding value of ground corn cobs is apparently high for feed of this character, and compares favorably with prairie hay. The productive value seems to be higher than that of some varieties of prairie hay. It apparently has a value of about eighty-three per cent. of alfalfa hay, and

180 per cent. of cottonseed hulls. It seems to be a better feed than has generally been supposed.

Cotton Burs

Requests for the examination of cotton burs came from several sources. There are accumulations of cotton burs around every gin, and it is said that cows eat them readily. The cotton burs contain some seed and lint.

In the digestion experiments here reported, the seed and lint was separated from the burs so that the digestibility is of the burs alone. The burs were fed with alfalfa hay, and were eaten well by one sheep though not by the other. The productive value is about fifty-five per cent. that of alfalfa hay. The feeding value of cotton burs is less than that of prairie hay, but somewhat more than the feed value of cottonseed hulls, apparently about twenty-five per cent. more.

Cold-pressed Cottonseed

Digestion experiment No. 89 was made with cold-pressed cottonseed made from heated seed. The extraction of the oil from this sample was very poor, and the product contained eighteen per cent. oil. The production coefficients of all the constituents of this sample, with the exception of the oil, is lower than the average for cold-pressed cottonseed.

The high contents of fat, of course, add considerably to the feeding value of the particular sample studied. According to the experiment, cold-pressed cottonseed would have about eighty-five per cent. of the product of the same composition made from good seed. There is always danger that poisonous substances will develop when cottonseed heats, though the actual cases of injury seem to be rare.

Peanut Hay

Peanut hay was used in digestion experiment No. 87. It contained no nuts. It was eaten readily by the sheep, although some residue was left by one of the sheep. According to our experiments, peanut hay has a feeding value of about twenty-eight per cent. more than alfalfa hay and about ninety per cent. of wheat bran. It does not contain quite as much digestible protein as alfalfa but it contains a smaller percentage of crude fiber, which gives it a better feeding value.

Peanut Meal

Peanut meal of very high grade was used in digestion experiment No. 96. This peanut meal is of unusually good quality, containing only five per cent. of crude fiber. This means that it contains only a small amount of peanut hulls. The constituents of this peanut meal have a high digestibility. Peanut meal having a larger quantity of hulls would have a correspondingly lower digestibility, and lower feeding value.

since the hulls have no value as a feed. This peanut hay has a productive value about ten per cent. greater than corn.

Prairie Hay

Prairie hay was used in digestion experiments No. 85 and 86. It contains somewhat more crude fiber than the average Texas prairie hay, and has a lower digestibility and feeding value. There is always waste feeding prairie hay, which is difficult to take into consideration.

Rice Bran

Rice bran was used in digestion experiment No. 94, in connection with alfalfa hay. The sample used was of excellent quality and was eaten readily by the sheep. The digestibility of the constituents is close to the average previously found.

Rice bran containing twelve per cent. crude fiber has a productive value about twenty per cent. less than corn. The feeding value varies to some extent, as the percentage of fat is somewhat variable.

Rice Hulls

Rice hulls were fed together with alfalfa hay in digestion experiment No. 91. The feed was eaten well by one of the sheep, not so well by the other. The production coefficients found in this experiment are close to those found previously. The feeding value of rice hulls is very low, being about forty-eight per cent. of cottonseed hulls and twenty-three per cent. of alfalfa.

Rhodes Grass Hay

Rhodes grass hay was used in digestion experiment No. 82. The hay was eaten readily by one of the sheep, but not by the other. The digestibility of the hay eaten is quite close to that of the other hay. The productive value of the sample tested is higher than the average for Texas prairie hay, and is equal to alfalfa hay.

Soapweed Stem

The hard wooden stem of the soapweed, which has been shredded, was fed with cottonseed meal in experiment No. 102. The protein was not well digested, but the digestibility of the nitrogen-free extract is about the same as for hays. The productive value is about eighty per cent. that of Texas prairie hay and sixty-seven per cent. of alfalfa hay or forty-five per cent more than cottonseed hulls. The soapweed stem was eaten well by the animals.

Spanish Moss

Spanish moss was fed in connection with cottonseed meal in digestion experiment No. 103. It was eaten well by the animals, and had a

good digestibility. The productive value of the Spanish moss dried to about nine per cent. water content is about twenty per cent. more than that of alfalfa hay, although it contains no digestible protein. The sample used consisted of the green Spanish moss, which was collected and allowed to dry. It is possible that the dry Spanish moss which has died on the trees would have a much lower digestibility. According to this experiment, Spanish moss is well worth using as a feed if it can be secured at no great expense. The green Spanish moss has a productive value about ten per cent. more than cottonseed hulls, and about fifty per cent. that of alfalfa hay.

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Table 8.—Per cent digested.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Ash.
	Acorns, whole, D. E. 104, 14855-6-65-6	0	83.88	14.97	50.39	0
12601-2	Alfalfa hay, D. E. 84	70.38	28.15	49.74	72.68	38.71
14952-3	Alfalfa hay, D. E. 88-92	64.37	38.98	47.73	62.57	49.51
14034-5	Alfalfa hay, D. E. 93-97	70.93	26.14	43.71	70.72	39.55
	Alfalfa hay, average	75.3	38.4	46.2	68.8	49.9
14565-6	Bear grass, <i>yucca glauca</i> , D. E. 98	36.00	0	64.72	61.84	64.44
14714-5	Beet pulp, D. E. 100	55.35	0	77.19	87.25	2.08
	Beet pulp, average	52	0	83	83	.....
14584-5	Corn cobs, ground, D. E. 99	0	0	51.36	57.07	0
	Corn cobs, average	19	50	60	52	.....
14186-7	Cotton burs, D. E. 95	27.93	65.74	23.60	68.64	83.74
12965-6	Cottonseed (heated seed) cold pressed, D. E. 89	55.98	97.47	32.09	54.88	39.33
14717-8	Cottonseed feed, 13 per cent fiber, D. E. 101	87.73	100.00	55.32	34.14	91.08
12976-7	Peanut hulls, D. E. 90	43.43	82.03	7.66	57.57	34.81
	Peanut hulls, average (2)	52.8	89.0	12.0	57.6	20.8
12719-20	Peanut hay, D. E. 87	67.04	51.82	57.17	77.06	22.06
	Peanut hay, no nuts, average	64.0	63.8	49.6	75.5	29.6
14283-4	Peanut meal, 5 per cent fiber, D. E. 96	94.41	99.50	20.91	86.77	58.00
	Peanut meal, average	90	90	9	84	.....
12716-7	Prairie hay, D. E. 85-86	27.83	49.18	46.20	44.26	16.77
	Prairie hay, average	10.8	42.0	58.4	51.8	9.4
14186-7	Rice bran, D. E. 94	74.79	92.74	4.20	74.06	26.94
13192-3	Rice hulls, D. E. 91	8.89	79.33	0.40	30.80	24.49
12308-9	Rhodes grass hay, D. E. 83	46.62	52.59	69.98	64.32	34.36
11504-5	Rhodes grass, D. E. 82	.....	.....	.....	.....	.....
14795-6	Soap weed root, D. E. 102	4.14	0	32.81	70.41	0
14835-6	Spanish moss, D. E. 103	.54	15.61	51.86	77.29	24.32

Table 9.—Production coefficients.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Reference No.
14855-6-65-6	Acorns, D. E. 104.....	0	.502	-.103	.127	
12601-2	Alfalfa hay, D. E. 84.....	.165	.148	-.016	.182	
14952-3	Alfalfa hay, D. E. 88-92.....	.151	.205	-.021	.156	
14034-5	Alfalfa hay, D. E. 93-97.....	.168	.138	-.031	.177	
	Alfalfa hay, average.....	.177	.202	-.025	.172	3
14365-6	Bear grass, yucca glauca, D. E. 98.....	.085	0	.022	.155	
14714-5	Beet pulp, D. E. 100.....	.130	0	.053	.218	
	Beet pulp, average.....	.122	0	.067	.207	
14584-5	Corn cobs, ground, D. E. 99.....	0	0	-.012	.143	
	Corn cobs, ground, average.....	.044	.026	.010	.130	
14186-7	Cotton burs, D. E. 95.....	.066	.312	-.081	.172	
12965-6	Cottonseed, heated, cold pressed, D. E. 89.....	.132	.583	.010	.137	
	Cottonseed, cold pressed, average.....	.175	.514	.029	.158	6
14777-8	Cottonseed feed, 13 per cent fiber, D. E. 101.....	.206	.598	0	.085	
12976-7	Peanut hulls, commercial, D. E. 90.....	.102	.389	-.121	.144	
	Peanut hulls, commercial, average (2).....	.124	.422	-.110	.144	
12719-20	Peanut hay, no nuts, D. E. 87.....	.158	.246	0	.193	
	Peanut hay, no nuts, average.....	.150	.336	-.016	.189	
14283-4	Peanut meal, 5 per cent fiber, D. E. 96.....	.222	.595	-.090	.217	
12716-7	Prairie hay, D. E. 85-6.....	.065	.259	-.024	.111	
	Prairie hay, average.....	.025	.221	.006	.130	3
14186-7	Rice bran, D. E. 94.....	.176	.555	-.060	.185	
	Rice bran, 12 per cent fiber, average.....	.151	.538	-.020	.205	6
	Rice bran, 15 per cent fiber, average.....	.147	.536	-.032	.196	
13192-3	Rice hulls, D. E. 91.....	.021	.376	-.070	.077	
	Rice hulls, average.....	.024	.318	-.070	.087	6
12508-9	Rhodes grass hay, D. E. 83.....	.110	.277	.035	.161	
11504-5	Rhodes grass hay, average.....	.107	.257	.033	.153	
14795-6	Soap weed root, D. E. 102.....	.010	0	-.058	.176	
14835-6	Spanish moss, D. E. 63.....	.001	.074	-.010	.193	

Table 10.—Average composition of feeds.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Water.	Ash.
11504-5	Rhodes grass hay, D. E. 82.....	5.44	1.68	32.12	43.07	7.70	10.49
12508-9	Rhodes grass hay, D. E. 83.....	5.67	1.61	32.08	42.30	7.95	10.39
12562	Rhodes grass hay.....	7.50	1.47	31.03	44.05	7.04	8.91
12488	Rhodes grass hay.....	4.44	1.50	32.13	43.46	8.10	10.37
	Average (4).....	5.76	1.56	31.84	43.23	7.57	10.04
14295	Green Spanish moss.....	4.47	2.06	26.28	41.50	18.29	7.40
14332	Gray Spanish moss.....	3.46	.49	13.04	72.85	6.85	3.27
14334	Mixed Spanish moss.....	2.99	.37	26.02	48.38	7.37	14.87
14341	French Spanish moss.....	5.40	1.95	27.98	53.67	2.51	8.49
14555	Spanish moss.....	3.34	2.06	26.05	59.28	5.50	3.77
14835-6	Spanish moss, D. E. 103.....	4.95	2.40	27.29	47.48	8.62	9.26
	Average.....	4.10	1.55	24.45	53.87	8.19	7.84
14333	Black Spanish moss.....	3.85	0.69	21.21	38.05	7.90	28.32
14295	Green Spanish moss.....	2.15	0.99	12.61	19.92	60.78	3.55
14341	Fresh Spanish moss.....	2.29	0.83	11.86	22.76	58.66	3.60
14535	Fresh Spanish moss.....	1.50	0.93	11.72	26.68	57.47	1.70
	Average.....	1.98	0.91	12.06	23.12	58.98	2.95

Table 10.—Average composition of feeds.—Continued.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Water.	Ash.
994	Bear grass	5.31	1.37	42.48	23.87	7.86	19.11
13084	Bear grass, dry (yuca glauca) . . .	9.03	1.45	36.89	38.98	8.57	5.08
13805	Bear grass (yuca glauca)	7.12	1.62	43.26	37.43	5.50	5.07
16060	Bear grass (yuca glauca)	7.57	2.31	33.10	40.17	5.78	11.07
14565-6	Bear grass, D. E. 98 (yuca glauca)	6.73	2.02	38.68	37.38	6.75	8.48
	Average (4)	7.14	1.98	38.33	38.34	6.01	8.20
13805	Green bear grass	3.55	0.81	21.54	18.63	52.94	2.53
16060	Green bear grass	4.53	1.38	19.79	24.02	43.65	6.63
	Average	4.04	1.09	20.66	21.34	48.29	4.58
19189	Ground cotton burs	7.44	2.87	35.37	34.38	8.82	11.12
15524	Cotton burs from gin	8.04	2.15	33.41	40.14	9.01	7.25
14223-4	Cotton burs, seed removed, D. E. 95	7.69	2.11	35.17	38.98	6.41	9.64
14299	Cotton burs	11.28	3.20	31.92	38.84	7.91	6.85
14303	Cotton burs from bolls	12.10	4.69	30.21	35.50	9.43	7.77
19190	Ground cotton burs	8.30	2.51	35.72	41.97	6.91	4.59
	Average	9.11	2.92	33.69	38.30	8.08	7.87
14229	Seed and lint from burrs, 14223 . . .	18.56	16.28	26.28	27.97	4.90	6.01
14301	Leaves, etc., from gin	9.59	1.66	15.68	42.66	7.61	22.80

Table 11.—Composition excrement.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Water.	Ash.
12559	Sheep No. 1, D. E. 83	8.22	2.30	22.49	42.02	6.04	18.93
12560	Sheep No. 2, D. E. 83	7.35	1.92	25.24	42.30	6.46	16.73
12707	Sheep No. 2, D. E. 84	8.69	3.02	42.83	28.18	6.35	10.93
12708	Sheep No. 3, D. E. 84	9.66	3.22	44.21	25.30	6.03	11.58
12718	Sheep No. 2, D. E. 85	6.66	1.94	30.34	45.27	5.52	10.27
12719	Sheep No. 3, D. E. 85	7.07	1.50	31.86	43.90	6.16	9.51
12724	Sheep No. 2, D. E. 86	6.69	1.93	29.50	45.06	5.99	10.83
12725	Sheep No. 3, D. E. 86	6.69	1.49	31.25	43.88	6.91	9.78
12921	Sheep No. 1, D. E. 87	9.72	3.62	24.67	30.84	6.31	24.84
12922	Sheep No. 2, D. E. 87	8.19	3.65	26.90	29.06	5.54	26.66
12954	Sheep No. 2, D. E. 88	8.44	2.13	47.09	27.03	6.81	8.50
12955	Sheep No. 3, D. E. 88	9.00	1.84	46.18	28.58	6.64	7.76
12967	Sheep No. 2, D. E. 89	17.75	1.63	40.47	26.56	7.03	6.56
12968	Sheep No. 3, D. E. 89	15.22	1.49	40.73	27.74	7.90	8.92
12978	Sheep No. 2, D. E. 90	6.78	1.08	60.06	20.78	6.50	4.83
12979	Sheep No. 3, D. E. 90	7.03	.98	60.58	19.79	6.67	4.95
13194	Sheep No. 2, D. E. 91	6.16	1.19	50.18	24.70	7.70	10.70
13195	Sheep No. 3, D. E. 91	5.13	0.83	44.34	26.25	6.16	17.29
13211	Sheep No. 2, D. E. 92	8.35	2.03	48.18	25.70	7.24	8.50
13212	Sheep No. 3, D. E. 92	8.63	1.85	47.51	26.98	6.84	8.19
14036	Sheep No. 2, D. E. 93	8.70	2.99	46.54	26.48	3.86	11.43
14037	Sheep No. 3, D. E. 93	9.77	3.40	45.36	25.34	3.87	12.26
14188	Sheep No. 2, D. E. 94	7.99	2.95	40.38	30.40	5.89	12.39
14189	Sheep No. 3, D. E. 94	10.13	2.60	40.10	27.22	5.86	14.09
14125	Sheep No. 2, D. E. 95	9.55	2.17	48.03	25.90	7.28	7.27
14226	Sheep No. 3, D. E. 95	9.90	2.24	48.16	24.40	7.43	7.89
14285	Sheep No. 2, D. E. 96	10.57	2.09	45.38	23.96	6.64	11.36
14286	Sheep No. 3, D. E. 96	13.22	2.29	41.87	23.35	6.72	12.50
14306	Sheep No. 2, D. E. 97	8.66	2.83	45.06	25.70	5.98	11.77
14307	Sheep No. 3, D. E. 97	9.32	2.45	45.27	25.62	6.24	11.10
14567	Sheep No. 2, D. E. 98	9.85	6.38	34.07	30.94	6.36	12.40
14568	Sheep No. 3, D. E. 98	9.02	6.70	37.08	31.03	5.67	10.50
14586	Sheep No. 2, D. E. 99	7.27	.86	31.46	45.16	7.48	7.77
14587	Sheep No. 3, D. E. 99	7.98	.76	25.77	48.89	9.95	6.65
14716	Sheep No. 2, D. E. 100	20.77	5.14	22.58	31.26	6.20	14.05
14717	Sheep No. 3, D. E. 100	20.24	4.4	22.64	31.20	6.22	15.23
14779	Sheep No. 2, D. E. 101	9.50	.59	27.65	30.49	6.28	5.49
14780	Sheep No. 3, D. E. 101	9.59	.62	27.58	49.42	8.33	4.46
14799	Sheep No. 2, D. E. 102	10.43	2.56	35.11	29.73	7.23	14.94
14800	Sheep No. 3, D. E. 102	8.89	2.10	36.54	30.84	6.26	15.37

Table 11.—Composition excrement—continued.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Water.	Ash.
14838	Sheep No. 2, D. E. 103.....	13.44	2.65	25.00	39.92	7.33	11.66
14840	Sheep No. 3, D. E. 103.....	14.00	2.81	25.10	38.53	7.52	12.04
14857	Sheep No. 2, D. E. 104.....	9.02	1.00	28.11	51.51	5.11	5.21
14858	Sheep No. 3, D. E. 104.....	8.93	.79	28.11	52.19	5.25	4.18
12539	Sheep No. 1, D. E. 83.....	5.53	1.35	32.91	44.08	6.30	9.83
12540	Sheep No. 2, D. E. 83.....	5.21	1.34	34.97	42.81	8.51	9.16
12722	Sheep No. 2, D. E. 85.....	5.57	2.64	30.94	46.43	6.68	7.74
12723	Sheep No. 3, D. E. 85.....	5.35	2.66	31.91	46.20	6.45	7.43
12728	Sheep No. 2, D. E. 86.....	5.44	2.45	32.78	45.73	6.38	7.22
12729	Sheep No. 3, D. E. 86.....	4.72	2.33	32.58	46.06	7.26	7.05
12923	Sheep No. 2, D. E. 87.....	6.06	1.63	16.39	27.78	4.52	43.62
13200	Sheep No. 2, D. E. 90.....	5.18	0.75	65.66	19.29	6.42	2.70
13196	Sheep No. 2, D. E. 91.....	3.85	0.86	39.17	29.38	7.51	19.23
13197	Sheep No. 3, D. E. 91.....	5.22	1.14	31.68	33.38	7.49	21.09
13217	Sheep No. 2, D. E. 92.....	8.85	1.14	44.52	33.00	6.74	5.75

Table 12.—Residues.

Lab. No.		Protein.	Ether extract.	Crude fibre.	Nitrogen free extract.	Water.	Ash.
14195	Sheep No. 3, D. E. 93.....	9.91	1.39	38.14	38.59	5.04	6.93
14231	Sheep No. 3, D. E. 94.....	8.80	1.70	45.57	35.10	5.33	6.50
14289	Sheep No. 2, D. E. 95.....	7.15	1.82	36.69	36.09	8.18	10.07
14290	Sheep No. 3, D. E. 95.....	7.38	1.96	35.98	37.13	8.25	9.30
14310	Sheep No. 2, D. E. 96 (peanut meal).....	52.19	9.24	4.88	20.61	7.47	5.59
14311	Sheep No. 2, D. E. 96 (alfalfa).....	34.40	3.86	.....	.....	5.59	8.05
14312	Sheep No. 3, D. E. 96 (peanut meal).....	62.62	9.49	5.00	19.98	7.77	5.14
14313	Sheep No. 3, D. E. 96 (alfalfa).....	13.13	6.08	17.83	29.15	7.48	6.33
14322	Sheep No. 3, D. E. 97.....	9.26	1.05	43.38	33.04	6.25	7.02
14579	Sheep No. 1, D. E. 98.....	6.02	2.05	37.73	40.30	8.27	5.63
14580	Sheep No. 2, D. E. 98.....	7.81	2.37	36.75	39.69	7.29	6.09
14707	Sheep No. 2, D. E. 99.....	2.36	.38	35.12	52.08	8.52	1.54
14708	Sheep No. 1, D. E. 99.....	2.77	.43	34.73	48.27	11.84	1.96
14732	Sheep No. 3, D. E. 100.....	10.75	.25	21.17	56.47	7.71	3.65
14733	Sheep No. 4, D. E. 100.....	10.51	.37	21.54	56.70	7.51	3.37
14791	Sheep No. 1, D. E. 101.....	4.28	.49	33.14	49.33	9.98	2.78
14792	Sheep No. 2, D. E. 101.....	6.21	1.06	31.17	48.60	8.74	4.22
14832	Sheep No. 1, D. E. 102.....	4.96	1.52	34.04	44.41	7.73	7.34
14833	Sheep No. 2, D. E. 102.....	6.67	1.56	41.89	32.79	8.22	8.87
14848	Sheep No. 1, D. E. 103.....	16.69	2.67	26.09	34.94	10.02	9.59
14849	Sheep No. 2, D. E. 103.....	15.93	3.09	26.87	34.66	8.39	11.06
14868	Sheep No. 2, D. E. 104.....	3.40	1.52	29.46	55.19	8.02	2.41
14869	Sheep No. 1, D. E. 104.....	3.06	.42	30.14	53.93	9.66	2.79

Table 13.—Nutrients fed, digested and excreted, in grams per period.

	Protein.	Ether extract.	Crude fiber.	Nitro- gen free extract.	Ash.
Digestion Period No. 83 With Rhodes Grass Hay. Sheep No. 1—					
Fed 5600 gms. No. 12508-9.....	317.52	90.16	1796.48	2368.80	281.84
Residue 3009 gms. No. 12539.....	166.40	40.62	990.26	1326.37	295.77
Eaten.....	151.12	49.54	806.22	1042.43	286.07
Excreted 901.8 gms. No. 12559.....	74.13	20.74	202.81	378.94	170.71
Digested.....	76.99	28.80	603.41	663.49	115.36
Percentage digested.....	50.95	58.13	74.97	73.27	40.34
Sheep No. 2—					
Total fed 5600 gms.....	317.52	90.16	1796.48	2368.80	581.84
Residue 164 gms. No. 12540.....	8.54	2.20	57.35	70.21	15.02
Eaten.....	308.98	87.96	1739.13	2298.59	566.82
Excreted 2426.7 gms. No. 12560.....	178.36	46.59	612.50	1026.49	405.99
Digested.....	130.62	41.37	1130.01	1272.10	160.83
Percentage digested.....	42.29	47.04	64.98	55.36	28.37
Average percentage Rhodes grass hay digested.....	46.62	52.59	69.98	64.32	34.36
Digestion Period No. 84 With Alfalfa Hay. Sheep No. 2—					
Fed 4200 gms alfalfa hay, No. 12601-2.....	508.62	71.40	1425.06	1617.00	301.98
Residue 15 gms. No.—discarded.....	1.82	.25	5.09	5.77	1.08
Eaten.....	506.80	71.75	1419.97	1611.23	300.90
Excreted 1746 gms. No. 12707.....	151.72	52.73	747.71	492.02	190.84
Digested.....	355.08	18.42	672.26	1119.21	110.06
Percentage digested.....	70.06	25.89	47.34	69.47	36.58
Sheep No. 3—					
Total fed 4200 gms.....	508.62	71.40	1425.06	1617.00	301.98
Residue 11 gms. No.—discarded.....	1.33	.19	3.73	4.23	.79
Eaten.....	507.29	71.21	1421.33	1612.77	301.19
Excreted 1539 gms. No. 12708.....	148.67	49.56	680.39	389.37	178.21
Digested.....	358.62	21.65	740.94	1223.40	122.98
Percentage digested.....	70.70	30.40	52.14	75.89	40.84
Average percentage alfalfa hay digested.....	70.38	28.15	49.74	72.68	38.71
Digestion Period No. 84 With Sheep No. 2—					
Fed 4200 gms. alfalfa No. 12601-2.....	508.62	71.40	1425.06	1617.00	301.98
Residue 15 gms.....	1.82	.25	5.09	5.77	1.08
Eaten.....	506.80	71.75	1419.97	1611.23	300.90
Excreted 1746 gms. No. 12707.....	151.72	52.73	747.71	492.02	190.84
Digested.....	355.08	18.42	672.26	1119.21	110.06
Percentage digested.....	70.06	25.89	47.34	69.47	36.58
Sheep No. 3—					
Total fed 4200.....	508.62	71.40	1425.06	1617.00	301.98
Residue 11 gms.....	1.33	.19	3.73	4.23	.79
Eaten.....	507.29	71.21	1421.33	1612.77	301.19
Excreted 1539 gms. No. 12708.....	148.67	49.56	680.39	389.37	178.21
Digested.....	358.62	21.65	740.94	1223.40	122.98
Percentage digested.....	70.70	30.40	52.14	75.89	40.84
Average percentage alfalfa hay digested.....	70.38	28.15	49.74	72.68	38.71

Table 13.—Nutrients fed, digested and excreted, in grams per period.—Continued.

	Protein.	Ether extract.	Crude fiber.	Nitro- gen free extract.	Ash.
Digestion Period No. 85 With Prairie Hay. Sheep No. 2—					
Fed 4200 gms. No. 12716-7.....	223.02	88.20	1372.14	1927.80	296.10
Residue 961 gms. No. 12722.....	53.53	25.37	297.33	446.19	74.38
Eaten.....	169.49	62.83	1074.81	1481.61	221.72
Excreted 1822.3 gms. No. 12718.....	121.37	35.35	552.89	824.96	187.15
Digested.....	48.12	27.48	521.92	656.65	34.57
Percentage digested.....	28.38	43.73	48.59	44.34	15.59
Sheep No. 3—					
Total fed 4200 gms.....	223.02	88.20	1372.14	1927.10	296.10
Residue 936 gms. No. 12723.....	50.08	24.90	298.68	432.40	69.54
Eaten.....	172.94	63.30	1073.46	1495.40	226.56
Excreted 2016 gms. No. 12719.....	142.53	30.24	642.30	884.92	191.72
Digested.....	30.41	33.06	431.16	610.48	34.84
Percentage digested from prairie hay.....	17.59	52.22	40.18	40.83	15.38
Average percentage prairie hay digested.....	22.99	47.98	44.39	42.59	15.49
Average percentage digested, D. E. 86.....	32.67	50.37	48.02	45.93	18.04
Average, 85-86.....	27.83	49.18	46.21	44.26	16.77
Digestion Period No. 86 With Prairie Hay. Sheep No. 2—					
Fed 5600 gms. No. 12716-7.....	297.36	117.60	1829.52	2570.40	394.80
Residue 1912 gms. No. 12728.....	104.01	46.84	626.76	874.36	138.05
Eaten.....	193.35	70.76	1202.76	1696.04	256.75
Excreted 18940 gms. No. 12724.....	126.71	36.55	558.73	853.44	205.12
Digested.....	66.64	34.21	644.03	842.60	50.63
Percentage digested.....	34.21	48.35	53.58	49.68	19.72
Sheep No. 3—					
Total fed 5600 gms.....	297.36	117.60	182.52	2570.40	394.80
Residue 2693 gms. No. 12729.....	127.11	62.75	877.38	1240.40	189.86
Eaten.....	170.25	54.85	952.14	1330.00	204.94
Excreted 1752.7 gms. No. 12725.....	117.27	26.11	547.72	769.08	171.41
Digested.....	52.99	28.74	404.42	560.92	33.53
Percentage digested.....	31.13	52.39	42.46	42.17	16.36
Average percentage prairie hay digested.....	32.67	50.37	48.02	45.93	18.04
Digestion Period No. 87 With Peanut Hay. Sheep No. 1—					
Fed 4200 gms. No. 12919-20.....	400.68	111.72	900.06	1927.38	569.94
Residue 402 gms. No. 12923.....	24.36	6.55	65.89	111.68	175.35
Eaten.....	376.32	105.17	834.17	1815.70	394.59
Excreted 1309.5 gms. No. 12921.....	127.28	47.40	323.05	403.85	325.28
Digested.....	249.04	57.77	511.12	1411.85	69.31
Percentage digested.....	66.17	54.97	61.27	77.79	17.57
Sheep No. 2—					
Total fed 4200 gms.....	400.68	111.72	900.06	1927.38	569.94
Residue 0 gms. No. 12924.....					
Excreted 1570.3 gms. No. 12922.....	128.61	57.36	422.41	456.33	418.64
Digested.....	272.07	54.36	477.65	1471.05	151.30
Percentage digested.....	67.91	48.67	53.07	76.33	26.55
Average percentage peanut hay digested.....	67.04	51.82	57.17	77.06	22.06

Table 13.—Nutrients fed, digested and excreted, in grams per period.—Continued.

	Protein.	Ether extract.	Crude fiber.	Nitro- gen free extract.	Ash.
Digestion Period No. 88 With Alfalfa Hay. Sheep No. 2—					
Fed 4200 gms. No. 12952-3	477.96	63.84	1632.12	1431.78	322.98
Residue 11 gms. No. 952-3	1.25	0.17	4.27	3.75	0.85
Eaten	476.71	63.67	1627.85	1428.03	322.13
Excreted 2083.1 gms. No. 12954	175.81	44.37	980.93	563.06	177.06
Digested	300.90	19.30	646.92	864.97	145.07
Percentage digested	63.12	30.31	39.74	60.57	45.03
Sheep No. 3—					
Total fed	477.96	63.84	1632.12	1431.78	322.98
Residue	187.50	38.33	962.07	595.41	161.66
Excreted 2083.3 gms. No. 12955	187.50	38.33	962.07	595.41	161.66
Digested	290.46	25.51	670.05	836.37	161.32
Percentage digested	60.77	39.96	41.05	58.41	49.95
Average percentage alfalfa hay digested	61.95	35.14	40.40	59.49	47.49
Digestion Period No. 89 With Alfalfa Hay and Cold Pressed Cottonseed From Burned Seed. Sheep No. 2—					
Fed 2100 gms. alfalfa hay No. 12952-3	238.98	31.92	816.06	715.89	161.49
2100 gms. cold pressed cottonseed No. 12965-6	502.53	382.20	498.12	494.34	99.77
Total fed 4200	741.51	414.12	1314.18	1210.23	261.24
Excreted 1567.6 gms. No. 12967	278.25	25.55	634.41	416.35	102.83
Digested	463.26	388.57	679.77	793.88	158.41
Digested from alfalfa	153.83	12.44	389.51	447.93	79.95
Digested from cold pressed cottonseed	309.43	376.13	290.26	345.95	78.46
Percentage digested	61.58	98.41	58.27	69.99	78.66
Sheep No. 3—					
Total fed	741.51	414.12	1314.18	1210.23	261.24
Excreted 21981 gms. No. 12968	334.55	32.75	895.29	565.79	196.07
Digested	406.96	381.37	418.89	644.44	65.17
Digested from alfalfa	153.83	12.44	389.51	447.93	79.95
Digested from cold pressed cottonseed	253.13	368.93	29.38	196.51	0
Percentage digested from cold pressed cotton- seed	50.31	96.52	5.90	39.76	0
Average percentage cold pressed cottonseed digested	55.98	97.47	32.09	54.88	39.33

Table 13.—Nutrients fed, digested and excreted, in grams per period.—Continued.

	Protein.	Ether extract.	Crude fiber.	Nitrogen free extract.	Ash.
Digestion Period No. 90 With Peanut Hulls and Alfalfa Hay. Sheep No. 2—					
Fed 2100 gms. Peanut hulls No. 12976-7.....	157.08	34.86	1202.04	491.61	63.63
2100 gms. alfalfa No. 12952-3.	238.98	31.92	816.06	715.89	161.49
Total fed 4200 gms.....	396.06	66.78	2018.10	1207.50	275.12
Residue 101 gms. No. 13200 peanut hulls..	5.23	0.76	66.32	19.48	2.73
Eaten.....	390.83	66.02	1961.78	1188.02	222.39
Excreted 2377-1 gms. No. 12978.....	161.17	25.67	1426.97	493.96	114.81
Digested.....	229.66	40.35	524.81	694.06	107.58
Digested from alfalfa.....	153.83	12.44	389.51	447.93	79.95
Digested from peanut hulls.....	75.83	27.91	135.30	246.13	27.63
Percentage digested.....	49.94	81.85	11.92	66.14	45.34
Percentage digested from peanut hulls eaten..	151.85	34.10	1135.72	372.13	60.93
Sheep No. 3—					
Total fed 4200 gms.....	396.06	66.78	2018.10	1207.50	225.12
Excreted 2620.8 gms. No. 12979.....	184.24	25.68	1587.68	518.66	129.73
Digested.....	211.82	41.10	430.42	688.84	93.39
Digested from alfalfa.....	153.83	12.44	384.51	447.93	79.93
Digested from peanut hulls.....	57.99	28.66	40.91	240.91	15.44
Percentage digested.....	36.92	82.21	3.40	49.00	24.27
Average percentage peanut hulls digested....	43.43	82.03	7.66	57.57	34.81
Digestion Period No. 91 With Rice Hulls and Alfalfa Hay. Sheep No. 2—					
Fed 2100 gms. rice hulls No. 13192-3.....	62.37	13.23	850.08	600.60	408.87
2100 gms. alfalfa No. 12952-3.....	238.98	31.92	816.06	715.89	161.49
Total fed 4200 gms.....	301.35	45.15	1666.14	1316.49	570.36
Residue 40 gms. alfalfa No. 12952-3.....	4.55	.60	15.54	13.64	3.08
1281 gms. rice hulls No. 13196.....	49.32	11.02	501.77	376.36	246.34
Total in residue.....	53.87	11.62	517.31	390.00	249.42
Eaten.....	247.48	33.53	1148.83	926.49	320.94
Excreted 1522.6 gms. No. 13194.....	93.79	18.12	764.04	376.08	162.92
Digested.....	153.69	15.41	384.79	550.41	158.02
Digested from alfalfa.....	151.37	12.21	382.09	439.40	78.43
Digested from rice hulls.....	2.34	3.20	2.70	111.01	79.59
Percentage digested from rice hulls.....	17.78	1.00	0.8	49.51	48.98
Alfalfa eaten.....	234.43	31.32	800.52	2702.25	158.41
Rice hulls eaten.....	13.05	2.21	348.31	1224.24	162.53
Sheep No. 3—					
Total fed.....	301.35	45.15	1666.14	1316.49	570.36
Residue 47 gms. No. 13197 rice hulls.....	2.45	.54	14.89	15.69	9.91
Eaten.....	298.90	44.61	1651.25	1300.80	60.45
Excreted 2979.5 gms. No. 13195.....	152.85	24.73	1321.11	782.12	515.16
Digested.....	146.05	19.88	330.14	518.68	45.29
Digested from alfalfa.....	153.83	12.44	389.51	447.93	99.95
Digested from rice hulls.....	0	7.44	0	70.75	0
Percentage digested from rice hulls.....	0	58.66	0	12.09	0
Average percentage rice hulls digested.....	8.89	79.33	0.40	30.80	24.49

Table 13.—Nutrients fed, digested and excreted, in grams per period.—Continued.

	Protein.	Ether extract.	Crude fiber.	Nitro- gen free extract.	Ash.
Digestion Period No. 92 With Alfalfa Hay. Sheep No. 2—					
Fed 4200 gms No. 12952-3.	477.96	63.84	1632.12	1431.78	332.98
Excreted 20650 gms. No. 13211.	172.43	41.92	994.92	530.70	175.52
Digested.	305.53	21.92	637.20	901.08	147.46
Percentage digested.	63.92	34.34	39.04	62.94	45.66
Sheep No. 3—					
Total fed.	477.96	63.84	1632.12	1431.78	322.98
Excreted 1680.6 gms. No. 13212	145.04	31.09	798.45	453.43	137.64
Digested.	332.92	32.75	833.67	978.35	185.34
Percentage digested.	69.15	51.30	51.08	68.33	57.39
Average percentage alfalfa digested.	66.79	42.82	45.06	65.64	51.53
Average of Periods 88 and 92.	64.37	38.98	47.73	62.57	49.51
Digestion Period No. 93 With Alfalfa Hay. Sheep No. 2—					
Fed 4200 gms. No. 14034-5.	539.7	68.5	1445.6	1558.6	334.7
Eaten.	539.7	68.5	1445.6	1558.6	334.7
Excreted 1636 gms. No. 14036.	142.3	48.9	761.4	433.2	187.0
Digested.	397.4	19.6	684.2	1125.4	147.7
Percentage digested from alfalfa.	73.63	28.61	47.33	72.21	44.13
Sheep No. 3—					
Total fed 4200.	539.7	68.5	1445.6	1558.6	334.7
Residue 1257 gms. No. 14195.	124.6	17.5	479.4	485.1	87.1
Eaten.	415.1	51.0	966.2	1073.5	247.6
Excreted 1326 gms. No. 14037.	129.5	45.1	601.5	336.0	162.6
Digested.	285.6	5.9	364.7	737.5	85.0
Percentage digested.	68.80	11.57	37.75	68.70	34.33
Average percentage alfalfa, Period 93.	71.22	20.09	42.54	70.45	39.23
Average percentage alfalfa digested Period 97	70.64	32.18	44.88	70.98	39.87
Average percentage alfalfa hay digested, 93 and 97.	70.93	26.14	43.71	70.72	39.55
Digestion Period No. 94 With Rice Bran and Alfalfa. Sheep No. 2—					
Fed 2100 gms. rice bran No. 14186-7.	284.6	282.2	264.2	962.8	161.5
2100 gms. alfalfa No. 14034-5.	269.9	34.3	722.8	779.3	167.4
Total fed.	554.5	316.5	987.0	1732.1	328.9
Excreted 1606.9 gms. No. 14188.	128.4	47.4	648.9	488.5	199.1
Digested.	426.1	269.1	338.1	1243.6	129.8
Digested from alfalfa.	191.4	9.0	315.9	551.1	66.2
Digested from rice bran.	234.7	260.1	22.2	692.5	63.6
Percentage digested from rice bran.	82.47	92.17	8.40	72.68	39.38
Sheep No. 3—					
Total fed.	554.5	316.5	987.0	1732.1	328.9
Excreted 1698.5 gms. No. 14189.	172.1	44.2	681.1	462.3	239.3
Digested.	382.4	272.3	305.9	1269.8	89.6
Digested from alfalfa.	191.4	9.0	315.9	551.1	66.2
Digested from rice bran.	191.0	263.3	10.0	718.7	23.4
Percentage digested.	67.11	93.30	0	75.43	14.49
Average percentage rice bran digested.	74.79	92.74	4.20	74.06	26.94

Table 13.—Nutrients fed, digested and excreted, in grams per period.—Continued.

	Protein.	Ether extract.	Crude fiber.	Nitro- gen free extract.	Ash.
Digestion Period No. 95 With Cotton Burs and Alfalfa.					
Sheep No. 2—					
Fed 2100 gms. burs No. 14223-4.....	161.5	44.3	738.6	818.6	202.4
2100 gms. alfalfa No. 14034-5.....	269.9	34.3	722.8	779.3	167.4
Total fed.....	431.4	78.6	1461.4	1597.9	369.8
Excreted 1827.4 gms. No. 14225.....	174.5	39.7	877.7	473.3	132.9
Digested.....	256.9	38.9	583.7	1124.6	226.9
Digested from alfalfa.....	191.4	9.0	315.9	551.1	66.2
Digested from cotton burs.....	65.5	29.9	267.8	573.5	170.7
Percentage digested from cotton burs.....	40.56	67.49	36.76	70.06	84.34
Sheep No. 3—					
Total fed.....	431.4	78.6	1461.4	1597.9	369.8
Residue 1054 gms. No. 14290 (cotton burs)...	77.8	20.7	379.2	391.4	98.0
Eaten.....	353.6	57.9	1082.2	1206.5	271.8
Excreted 1509.5 gms. No. 14226.....	149.4	33.8	727.0	368.3	118.8
Digested.....	204.2	24.1	355.2	838.2	153.0
Digested from alfalfa.....	191.4	9.0	315.9	551.1	66.2
Eaten from cotton burs.....	8.37	23.6	359.4	427.2	104.4
Digested from cotton burs.....	12.8	15.1	39.3	287.1	86.8
Percentage digested from cotton burs.....	15.29	63.98	10.93	67.21	83.14
Average percentage cotton burs digested.....	27.93	65.74	23.60	68.64	83.74
Digestion Period No. 96 With Peanut Meal and Alfalfa Hay.					
Sheep No. 2—					
Fed 2100 gms. peanut meal No. 14283-4.....	1138.8	209.4	105.2	434.9	101.2
2100 gms. alfalfa No. 14034-5.....	269.9	34.3	722.8	779.3	167.4
Total fed.....	1408.7	243.7	828.0	1214.2	268.6
Residue 105 gms. No. 14034-5.....	1.3	0.2	3.6	3.9	0.8
Alfalfa eaten.....	268.6	34.1	719.2	775.4	166.6
Total eaten.....	1407.4	243.5	824.4	1210.3	267.8
Excreted 1290.5 gms. No. 14285.....	136.4	27.0	585.6	309.2	146.6
Digested.....	1271.0	216.5	238.8	901.1	121.2
Digested from alfalfa.....	190.5	8.9	314.4	548.4	65.9
Digested from peanut meal.....	1080.5	207.6	75.6	352.1	55.3
Percentage digested from peanut meal.....	94.88	99.14	0	81.10	54.64
Sheep No. 3—					
Total fed.....	1408.7	243.7	828.0	1214.2	268.6
Residue 6 gms. No. 14034.5.....	.1	0.1	2.1	2.7	0.5
Alfalfa eaten.....	269.2	34.2	720.2	777.1	166.9
Eaten.....	1408.0	243.6	825.9	1212.0	268.1
Excreted 1115.1 gms. No. 14286.....	147.4	25.5	466.9	260.4	140.0
Digested.....	1260.6	218.1	359.0	951.6	128.1
Digested from alfalfa.....	190.9	9.0	315.0	549.6	66.0
Digested from peanut meal.....	1069.7	209.1	44.0	402.0	62.1
Percentage digested from peanut meal.....	93.93	99.86	41.82	92.43	61.36
Average percentage peanut meal digested.....	94.41	99.50	20.91	86.77	58.00

Table 13.—Nutrients fed, digested and excreted, in grams per period.—Continued.

	Protein.	Ether extract.	Crude fiber.	Nitro- gen free extract.	Ash. *
Digestion Period No. 97 With Alfalfa Hay.					
Sheep No. 2—					
Fed 4200 gms. alfalfa No. 14034-5.....	539.7	68.5	1445-	1558.6	334.7
Excreted 1742.0 gms. No. 14302.....	150.9	49.3	784.9	447.7	205.0
Digested.....	388.8	19.2	660.7	1110.9	129.7
Percentage digested from alfalfa.....	72.04	28.05	45.70	71.28	38.75
Sheep No. 3—					
Total fed.....	239.7	8.0	1445.6	1558.6	334.7
Residue 19.1 gms. No. 14322.....	1.8	.2	8.5	6.5	1.3
Eaten.....	537.9	68.3	1437.1	1552.1	333.4
Excreted 1776.0 gms. No. 14307.....	165.5	43.5	804.0	45.50	197.1
Digested.....	372.4	24.8	633.1	1097.1	136.3
Percentage digested from alfalfa.....	69.23	36.31	44.05	70.63	40.88
Average percentage alfalfa digested.....	70.64	32.18	44.88	70.98	39.87
Digestion Period No. 98 With Bear Grass.					
Sheep No. 1—					
Fed 4200 gms. No. 14565-6.....	286.7	84.8	1622.9	1570.0	356.2
Residue 2660 gms. No. 14579.....	16.01	54.5	1003.6	107.20	149.8
Eaten.....	122.6	30.3	619.3	498.0	206.4
Excreted 546.9 gms. No. 14067.....	53.9	34.9	186.3	169.2	67.8
Digested.....	68.7	-4.6	433.0	328.8	138.6
Percentage digested from bear grass.....	560.4	0	69.91	66.02	67.15
Sheep No. 2—					
Total fed.....	282.7	84.8	1622.9	1570.0	356.2
Residue 2040 gms. No. 14560.....	706.2	62.6	970.2	1047.8	160.8
Eaten.....	76.5	22.2	652.7	522.2	195.4
Excreted 712.5 gms. No. 14568.....	64.3	47.7	264.2	221.1	74.8
Digested.....	12.2	-2.55	388.5	301.1	120.6
Percentage digested from bear grass.....	15.95	0	59.52	57.66	61.72
Average percentage bear grass digested.....	36.00	0	64.72	61.84	6.44
Digestion Period No. 99 With Ground Corn Cobs.					
Sheep No. 1—					
Fed 4200 gms. No. 14584-5.....	119.7	13.9	1439.3	2260.0	80.2
Residue 2760 gms. No. 14708.....	76.5	11.9	958.5	1332.2	54.1
Eaten.....	43.2	2.0	480.8	927.8	26.1
Excreted 880.0 gms. No. 14586.....	62.5	7.4	270.6	388.4	66.9
Digested.....	-19.3	-5.4	210.2	539.4	-40.8
Percentage digested ground corn cobs.....	0	0	43.72	58.14	0
Sheep No. 2—					
Total fed.....	119.7	13.9	1439.3	2260.0	80.2
Residue 2840.0 gms. No. 14707.....	67.0	10.8	997.4	1479.1	43.7
Eaten.....	52.7	3.1	441.9	780.9	36.5
Excreted 700.8 gms. No. 14587.....	56.1	5.3	181.1	343.6	46.7
Digested.....	-3.4	-2.2	260.8	437.3	-10.2
Percentage digested from ground corn cobs...	0	0	59.00	56.00	0
Average percentage ground corn cobs digested	0	0	51.36	57.07	0

Table 13.—Nutrients fed, digested and excreted, in grams per period.—Continued.

	Protein.	Ether extract.	Crude fiber.	Nitro- gen free extract.	Ash.
Digestion Period No. 100 With Beet Pulp (Dried).					
Sheep No. 3—					
Fed 4200 gms. No. 147145.....	435.5	8.8	899.0	5309.6	130.6
Residue 2405 gms. No. 14732.....	258.5	6.0	509.1	1350.1	87.8
Eaten.....	177.0	2.8	388.9	951.5	42.8
Excreted 4649 gms. No. 14716.....	96.6	23.9	103.0	145.3	65.3
Digested.....	80.4	—21.1	283.9	806.2	—22.5
Percentage digested from beet pulp.....	45.42	0	73.02	84.81	0
Sheep No. 4—					
Total fed.....	435.5	8.8	898.0	2309.6	130.6
Residue 2375 gms. No. 14733.....	249.6	8.8	511.6	1346.6	80.0
Eaten.....	185.9	0.0	386.4	963.0	50.6
Excreted 318.6 gms. No. 14717.....	64.5	14.2	72.1	99.4	48.5
Digested.....	121.4	—14.2	314.3	863.6	2.1
Percentage digested from beet pulp.....	65.30	0	81.34	89.68	4.15
Average percentage beet pulp digested.....	45.35	0	77.19	87.75	2.08
Digestion Period No. 101 With Ground Corn Cobs and Cottonseed Meal.					
Sheep No. 1—					
Fed 2800 gms. cobs No. 14775-6.....	98.8	20.2	911.1	1477.8	86.0
1400 gms. cottonseed meal No. 14777-8..	581.6	84.8	174.7	391.7	70.1
Total fed.....	680.4	105.0	1085.8	1869.5	156.1
Residue 380 gms. No. 14791.....	16.3	1.9	125.9	187.5	10.6
Eaten.....	664.1	103.1	959.9	1682.0	145.5
Excreted 1601 gms. No. 14779.....	122.1	9.4	442.7	808.3	87.9
Digested.....	512.0	94.7	512.2	873.7	57.6
Digested from corn cobs 14584-5 (2420 gms.)	0	0	426.0	743.2	0
Digested from cottonseed meal.....	512.0	94.7	91.2	130.5	57.6
Percentage digested from cottonseed meal...	88.05	10.0	52.20	33.32	82.16
Sheep No. 2—					
Total fed.....	680.4	105.0	1085.8	1869.5	156.1
Residue 105 gms. No. 14792.....	6.5	1.1	32.7	51.0	4.4
Eaten.....	673.9	103.9	1053.1	1818.5	151.7
Excreted 1728 gms. No. 14780.....	165.7	10.7	476.6	854.0	77.1
Digested.....	508.2	93.2	576.5	964.5	74.6
Digested from corn cobs 14584-5 (2695 gms.)	0	0	474.4	827.6	0
Digested from cottonseed meal.....	508.2	93.2	102.1	136.9	74.6
Percentage digested from cottonseed meal...	87.43	10.0	58.44	34.95	10.0
Average percentage cottonseed meal digested.	87.73	100.00	55.32	34.14	91.08

Table 13.—Nutrients fed, digested and excreted, in grams per period.—Continued.

	Protein.	Ether extract.	Crude fiber.	Nitro- gen free extract.	Ash.
Digestion Period No. 102 With Soap Weed Root and Cottonseed Meal.					
Sheep No. 1—					
Fed 2800 gms. soap weed No. 14795-6.....	125.2	29.7	992.3	1252.1	159.6
1400 gms. cottonseed meal No. 14797-8..	598.5	88.2	171.5	362.5	69.7
Total fed.....	723.7	117.9	1163.8	1614.6	229.3
Residue 218 gms. No. 14822 (soap weed)....	10.8	3.3	74.2	96.8	16.0
Eaten.....	712.9	114.6	1089.6	1517.8	213.3
Excreted 1876.5 gms. No. 14799.....	195.7	48.0	658.8	557.9	280.3
Digested.....	577.2	66.6	430.8	959.9	—67.0
Digested from cottonseed meal Period 101..	525.1	88.2	94.9	123.8	63.5
Soap weed eaten.....	.....	.....	918.1	1152.1	.....
Digested.....	—6.9	—21.6	335.9	836.1	—130.5
Percentage digested from soap weed root.....	0	0	36.58	72.57	0
Sheep No. 2—					
Total fed.....	72.37	117.9	1163.8	1614.6	229.3
Residue 155 gms. No. 14833 (root weed)....	10.3	2.4	64.9	50.8	13.7
Eaten.....	71.34	115.5	1098.9	1563.8	215.6
Excreted 2011 gms. No. 14800.....	178.8	42.2	734.8	620.2	309.1
Digested.....	534.6	73.3	364.1	943.6	93.5
Digested from cottonseed meal, Period 101..	525.1	88.2	94.9	123.8	63.5
Soap weed eaten.....	114.9	.....	927.4	1201.3	.....
Digested.....	9.5	—14.9	269.2	819.8	—157.0
Percentage digested from soap weed.....	8.27	0	29.03	68.24	0
Average percentage soap weed digested.....	4.14	0	32.81	70.41	0
Digestion Period No. 103 With Cottonseed Meal and Spanish Moss.					
Sheep No. 1—					
Fed 2100 gms. moss No. 14835-6.....	103.9	50.4	573.1	997.1	194.4
2100 gms. cottonseed meal No. 14837-8..	858.5	124.7	270.9	585.3	101.9
Total fed.....	962.4	175.1	844.0	1582.4	246.3
Residue 102 gms. No. 14848, 1-3 meal.....	13.9	2.0	4.4	9.5	1.6
and 2-3 moss.....	3.1	0.7	22.2	26.1	8.2
Eaten.....	945.4	172.4	817.4	1546.8	286.5
Excreted 1613.0 gms. No. 14839.....	216.8	42.7	403.3	643.9	188.0
Digested.....	728.6	129.7	414.1	902.9	98.5
Eaten cottonseed meal.....	844.6	122.7	266.5	575.8	100.3
Digested from cottonseed meal (2066 gms.) Period 102.....	741.0	122.7	147.4	190.4	91.4
Digested from Spanish moss eaten.....	—12.4	7.0	266.7	712.5	7.1
Spanish moss eaten.....	100.8	49.7	550.9	971.0	186.2
Percentage digested from Spanish moss.....	0	14.08	48.41	73.38	38.13
Sheep No. 2—					
Total fed.....	962.4	175.1	844.0	1582.4	296.3
Residue Spanish moss.....	1.8	.8	18.1	20.3	7.5
Residue 80 gms. No. 14849, 1-3 meal.....	12.7	2.4	21.5	27.7	8.8
and 2-3 moss 26.6 gms. cottonseed meal.	10.9	1.6	3.4	7.4	1.3
Total.....	949.7	172.7	822.5	1554.7	287.5
Excreted 1464 gms. No. 14849.....	205.0	41.1	367.5	564.1	176.3
Digested.....	744.7	131.6	455.0	990.6	111.2
Cottonseed meal eaten.....	847.6	123.1	267.5	577.9	100.6
Digested from cottonseed meal.....	743.6	123.1	148.0	197.3	91.6
Spanish moss eaten.....	102.1	49.6	555.0	976.8	186.9
Digested from Spanish moss.....	1.1	8.5	319.0	793.3	19.6
Percentage digested.....	1.08	17.13	55.31	81.21	10.49
Average percentage Spanish moss digested...	.54	15.61	51.86	77.29	24.32

Table 13.—Nutrients fed, digested and excreted, in grams per period.—Continued.

	Protein.	Ether extract.	Crude fiber.	Nitro- gen free extract.	Ash.
Digestion Period No. 104 With Ground Corn Cobs and Acorns.					
Sheep No. 1—					
Fed 3080 gms. No. 14853-4.....	82.8	11.3	1032.7	1660.1	64.1
799 gms. acorn kernels No. 14855-6.....	41.4	74.4	17.8	588.4	16.9
321 gms. acorns, hulls 14865-66.....	13.5	5.3	116.8	150.7	9.1
Total fed.....	137.7	91.0	116.73	2399.2	90.1
Residue 2170 gms. No. 14869 (cobs).....	66.4	9.1	654.0	1170.3	60.5
Eaten.....	71.3	81.9	573.3	1228.9	29.6
Excreted 1295 gms. No. 14857.....	116.8	12.9	364.0	667.6	67.5
Digested.....	-45.5	69.0	149.3	561.3	-37.9
Ground cobs eaten.....	16.4	2.2	378.7	489.8	3.6
Digested from ground cobs.....	0	0	194.5	279.5	0
Acorns eaten.....	54.9	79.7	134.6	739.1	26.0
Digested from acorns.....	-45.51	69.0	-45.2	281.8	-37.9
Percentage digested.....	0	10.0	0	381.3	0
Sheep No. 2—					
Total fed.....	137.7	91.0	1167.3	2399.2	90.1
Residue 1820 gms. No. 14868 (cobs).....	61.9	27.7	536.1	1004.5	43.9
Eaten.....	75.8	63.3	631.2	1394.7	46.2
Excreted 1172 gms. No. 14858.....	104.7	9.3	335.9	611.7	49.0
Digested.....	-28.9	54.0	295.3	783.0	-2.8
Ground cobs eaten.....	20.9	16.4	496.6	555.6	20.2
Digested from ground cobs.....	0	0	255.0	317.1	0
Acorns eaten.....	54.9	79.7	134.6	739.1	26.0
Digested from acorns.....	-28.9	54.0	30.3	465.9	-2.8
Percentage digested.....	0	67.75	29.94	63.04	0
Average percentage acorns digested.....	0	83.88	14.97	50.59	0

SUMMARY

This bulletin contains a discussion of the composition and feeding value, based on digestibility, of acorns, alfalfa, bear grass, beet pulp, corn cobs, cotton burs, cottonseed feed, peanut hulls, peanut hay, peanut meal, rice bran, rice hulls, Rhodes grass, soapweed stem and Spanish moss. There are two groups of acorns, one of which is high in fat and the other low in fat.

REFERENCES

- Texas bulletin No. 166.
- Henry and Morrison, "Feeds and Feeding."
- Texas bulletin No. 203.
- Texas bulletin No. 234.
- Texas bulletin No. 191.
- Texas bulletin No. 185.