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New Fodder (Siloed *Shisham* Leaves) for Dairy Cows

BY

P. E. LANDER, M.A., D.Sc., A.I.C.,
Agricultural Chemist to Government, Punjab, Lyallpur

AND

PANDIT LAL CHAND DHARMANI, L.Ag.,
Agricultural College, Lyallpur

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A New Fodder (Siloed *Shisham* Leaves) for Dairy Cows.

[*Received for publication on 26th August 1924.*]

In a previous paper [1] some account was given of feeding trials with bullocks in which fresh *shisham* (*Dalbergia sissoo*) leaves were introduced as part of the animal's diet with a view to obtain some knowledge of their digestibility, and to see how far these leaves could be employed as an article of diet in times of fodder scarcity. Full details are given in that paper showing the defects of the fresh leaves, which produce diarrhœa and other digestive disturbances, and it was considered advisable to see whether their value as a fodder could be improved by siloing.

Accordingly about one hundred maunds of *shisham* leaves were gathered in June 1923, and siloed and formed the basis of an elaborate series of digestibility trials on bullocks carried out during the winter of 1923-24, and which will be presented separately. The trials on the dairy cows, a short account of which follows, were a short supplementary experiment carried out to see whether cows would eat this material, and whether the introduction of it into the dietary would have any effect, beneficial or otherwise, on the quantity and quality of the milk yield.

As recounted in the previous paper it will be seen that *shisham* leaves show by chemical analysis a food value comparable with that of green oats, and it was expected that as a result of siloing, the astringent principles would be destroyed and the resulting silage would prove of use.

During the period that the material was in the silo pit samples were taken at intervals and analysed, to determine the changes in chemical composition that take place during the process, and a description of these will be given at the end of this paper.

Four cows, designated as Nasibo, Moni, Rani and Lelan, were selected, and divided into two pairs according to their ages and lactation periods, one pair being between 4 and 5 years old and the other between 6 and 7 years. One animal from each set was an experimental and the other a control animal.

Pre-experimental ration.

This consisted of gram 2 lb., bran 1 lb., cake 1 lb., green stuff 24 lb. and 6 lb. of *bhusa* per animal yielding about an average of 9 lb. of milk

[1] *Mem. Dept. Agri. India, Chem. Ser.*, VII, No. 4.

daily (for Lelan and Rani), and gram 4 lb., bran 3 lb., cake 2 lb., green stuff 24 lb. and 6 lb. of *bhusa* per animal yielding about an average of 18-19 lb. of milk daily (for Nasibo and Moni).

Experimental ration.

It was decided to replace all the green stuff by an equal quantity of siloed *shisham* leaves, but only about 15 lb. were usually eaten by each

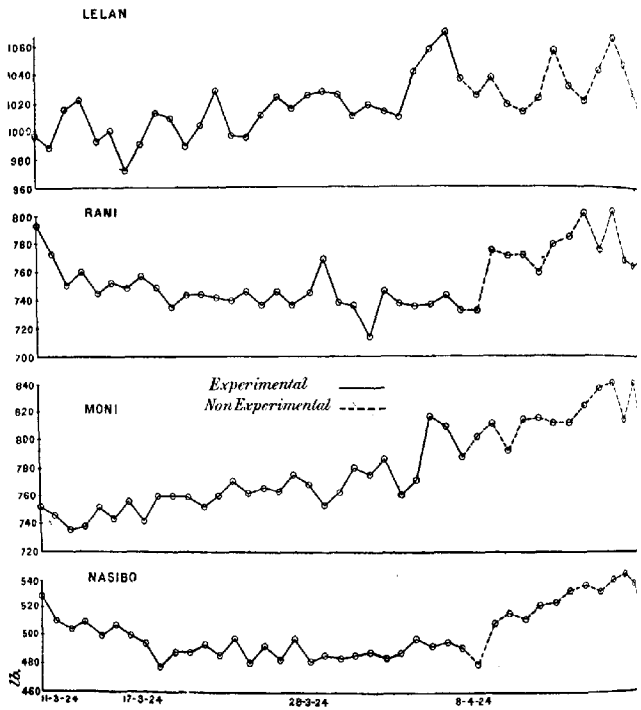

Fig. 1 Body Weight Curve.

animal per day, it being apparently necessary to educate the animals' taste to the new fodder.

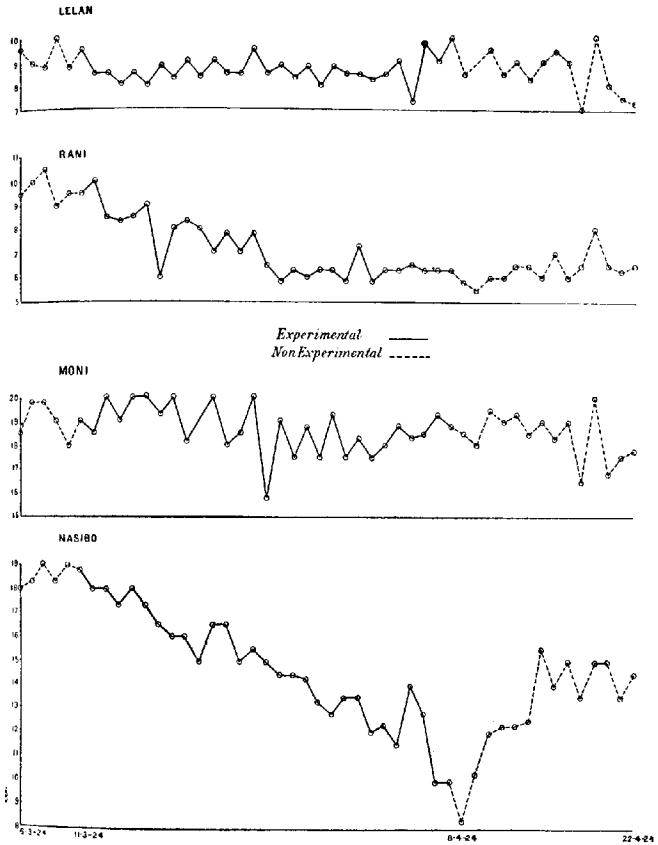

Fig. II. Milk Yield Curve.

Both animals decreased somewhat in weight after being put on the *shisham* diet, after which the weights remained steady and tended to rise as the animals became accustomed to it and ate more. The weights of all four animals during the course of the trial are shown in Fig. I. The animal named Nasibo was the smallest of all and showed the greatest fluctuation in milk yield, although her weight remained pretty constant.

Milk yield.

Full details of the milk yield are shown in Fig. II.

Taking the first pair of animals, Nasibo and Moni, we note that before the feeding of *shisham* commenced the daily average yield of milk was, for the control animal Moni, about 14·9 lb. in February and 18·9 lb. in March, and for the experimental animal Nasibo, 18·4 lb. in February and 18·1 lb. in March. Feeding commenced on March 12th and during the ensuing month on the *shisham* diet the average daily yield of the control animal was about the same, while that of the experimental animal was 14·6 lb., but it will be noted that the yield from this animal fell still further later on after it was put back on the ordinary diet, and the fall may be due to seasonal influences. Thus the yield in April after the animal had been put back on to the ordinary farm diet was only 13·1 lb. The daily average yield for the control animal in this after-period was 18·4 lb., being a slight drop. In interpreting any rise or fall in the daily yield both during and after the *shisham* feeding period, we have to consider also the fluctuations shown by the control animals and also the seasonal rise or fall as the case may be.

In the case of the second pair of animals, Lelan and Rani, the daily average yield of milk for the control animal Lelan was 8·4 and 9 lb. during February and March respectively up to the time the *shisham* feeding commenced. The daily average for the experimental animal Rani was 9 lb. for February and 9·6 lb. for March. During the following month the average daily yield for the control animal Lelan was 8·6 lb. showing a slight decrease, while for the experimental animal it was about 7·1 lb. showing likewise a decrease. After being replaced on the normal diet the experimental animal showed a slight decrease in the daily milk yield which averaged 6·4 lb.

The analyses of the milk, carried out daily, are shown in Tables I and II from which it will be seen that there is practically no difference at all in the composition of the milk from the two sets of animals. Furthermore, the milk from the *shisham* fed animals was entirely free from any unusual taste.

TABLE I.

Nasibo (Silo Fed).

Date	DAILY RATION EATEN		Body weight	Milk yield	Specific gravity at 60° F.	QUANTITIES PER 100 GRAMS OF MILK							
											NITROGEN		
	Ensilaged *Shaham* fodder	Bhusa				Fat	Total solids	Solids not fat, by difference	Ash	Lactose	Total	Casein	Soluble, by difference
	lb.	lb.	lb.	lb.									
March 1924.													
6th	..	..	..	18·00	1029	4·4	15·05	10·65	..	..	0·48	..	..
7th	..	..	..	18·25	1029	4·4	14·60	10·20	..	..	0·46	..	..
8th	..	..	..	19·00	1029	4·3	13·24	8·94	..	..	0·52	0·38	0·14
9th	..	..	..	18·25	1029	4·6	13·59	8·99	0·67	..	0·48	0·36	0·12
10th	..	..	..	19·00	1029	4·7	13·42	8·72	0·57	..	..	..	..
11th	..	..	528	18·75	1029	4·8	13·80	9·00	0·65	..	..	..	..
12th	1	2	510	18·00	1029	5·0	13·56	8·56	0·67	..	0·50	0·37	0·13
13th	1	2	504	18·00	1029	4·8	13·73	8·93	0·68	..	..	..	..
14th	..	2	510	17·25	1028	4·8	13·41	8·61	0·68	..	..	0·34	..
15th	..	1	500	18·00	1029	4·8	13·20	8·40	0·73	..	0·37	0·30	0·07
16th	1	1	508	17·25	1029	5·4	14·02	8·62	0·66	..	0·47	0·35	0·12
17th	1·50	1	500	16·50	1027	5·0	13·25	8·25	0·62	..	0·40	..	..
18th	7·00	1	494	16·00	1028	5·5	14·29	8·79	0·62	..	..	0·43	..
19th	5	1	478	16·00	1029	4·6	13·38	8·78	0·64	..	..	0·32	..
20th	8·50	1	488	15·00	1026	5·8	13·99	8·19	0·58	..	..	0·34	..
21st	10	2	488	16·50	1027	5·1	13·61	8·51	0·63	..	..	0·29	..
22nd	3	2	493	16·50	1027	5·0	13·41	8·44	0·57	..	..	0·27	..
23rd	10·50	2	486	15·00	1027	4·5	13·40	8·90	0·67	..	0·44	0·33	0·11
24th	13·50	2	497	15·50	1027	4·2	12·60	8·40	0·67	..	..	0·34	..
25th	12	4	480	15·00	1027	6·3	15·46	9·16	0·62	..	..	0·34	..
26th	16·50	4	492	14·50	1028	4·5	13·14	8·64	0·64	..	0·45	0·33	0·12
27th	17	2	483	14·50	1027	6·1	14·21	8·11	0·66	5·26	0·47	0·34	0·13
28th	12	..	497	14·25	1028	5·2	13·83	8·63	0·63	4·91	0·46	0·34	0·12
29th	21·50	..	482	13·25	1028	4·5	13·61	9·11	0·67	4·89	0·46	0·34	0·12
30th	18	..	486	12·75	1027	5·7	14·60	8·90	0·68	5·39	0·49	0·36	0·13
31st	21·50	..	484	13·50	1028	4·7	13·47	8·77	0·64	4·93	0·45	0·34	0·11
April.													
1st	18	..	485	13·50	1027	6·5	15·89	9·39	0·64	5·04	0·41	0·35	0·09
2nd	22·5	..	488	12·00	1027	6·2	14·49	8·29	..	4·82	0·40	0·35	0·11
3rd	25·5	..	484	12·25	1028	5·3	14·24	8·94	0·63	5·18	0·49	0·35	0·14
4th	23·5	..	488	11·50	1027	5·8	14·26	8·46	0·66	5·14	0·48	0·35	0·13
5th	28·5	..	497	14·00	1026	5·9	14·17	8·27	0·58	5·64	0·47	0·35	0·12
6th	33·5	..	492	12·75	1027	5·5	14·69	9·19	0·64	5·14	0·47	0·36	0·11
7th	18·5	..	493	10·00	1026	6·8	15·72	8·72	0·68	5·38	0·48	0·35	0·13
8th	2	..	492	10·00	1025	5·5	13·15	7·65	0·52	5·29	0·39	0·30	0·09
9th	..	..	480	8·25	..	..	..	..	..	..	..	..	..
10th	..	..	508	10·25	..	..	..	..	..	..	..	..	..
11th	..	..	516	12·00	..	..	..	..	..	..	..	..	..
12th	..	..	512	12·25	..	..	..	..	..	..	..	..	..
13th	..	..	521	12·25	..	..	..	..	..	..	..	..	..
14th	..	..	524	12·50	..	..	..	..	..	..	..	..	..
15th	..	..	532	13·50	..	..	..	..	..	..	..	..	..
16th	..	..	536	14·00	..	..	..	..	..	..	..	..	..
17th	..	..	532	15·00	..	..	..	..	..	..	..	..	..
18th	..	..	540	13·50	..	..	..	..	..	..	..	..	..
19th	..	..	544	15·00	..	..	..	..	..	..	..	..	..
20th	..	..	537	15·00	..	..	..	..	..	..	..	..	..
21st	..	..	516	13·50	..	..	..	..	..	..	..	..	..
22nd	..	..	523	14·50	..	..	..	..	..	..	..	..	..

TABLE I—*contd.*

Moni (Control).

Date	Body weight	Milk yield	Specific gravity at 60° F.	QUANTITIES PER 100 GRAMS OF MILK							
				Fat	Total solids	Solids not fat by difference	Ash	Lactose	NITROGEN		
									Total	Casein	Soluble by difference
	lb.	lb.									
March 1924.											
6th	..	18·50	1029	4·0	13·42	9·42	..	..	0·52	..	..
7th	..	19·75	1030	4·0	13·74	9·74	..	..	0·53	0·41	0·12
8th	..	19·75	1030	4·5	14·29	9·79	..	..	0·63	0·48	0·15
9th	..	19·06	1031	4·3	13·93	9·63	0·66	..	0·54	0·40	0·14
10th	..	18·00	1030	3·9	13·22	9·32	0·63	..	..	..	..
11th	752	19·75	1028	4·4	13·93	9·53	0·65	..	..	..	..
12th	746	18·50	1029	4·1	13·42	9·32	0·72	..	..	0·41	..
13th	736	20·00	1030	4·5	14·10	9·60	0·68	..	..	0·43	..
14th	738	19·00	1030	4·8	14·20	9·40	0·68	..	..	..	..
15th	752	20·00	1031	4·5	13·45	8·95	0·68	..	..	0·41	..
16th	744	20·00	1031	4·7	13·06	8·36	0·65	..	..	0·42	..
17th	756	19·25	1026	4·2	12·07	7·87	0·68	..	0·46	0·31	0·12
18th	742	20·00	1030	4·6	14·01	9·41	0·74	..	Spoilled		
19th	740	18·00	1027	3·6	13·01	9·41	0·75	..	..	0·41	..
20th	740	19·00	1029	5·2	14·16	8·96	0·63	..	..	0·45	..
21st	739	20·00	1029	4·3	13·56	9·26	0·67	..	..	0·41	..
22nd	752	18·00	1031	4·2	13·02	9·72	0·70	..	..	0·41	..
23rd	760	18·50					Spoilet				
24th	770	20·00	1030	4·5	13·63	9·13	0·67	..	..	0·42	..
25th	761	15·75	1029	4·9	14·30	9·40	0·70	..	..	0·36	..
26th	765	19·00	1030	4·6	13·71	9·11	0·59	..	0·49	0·38	0·11
27th	762	17·50	1029	5·2	13·74	8·54	0·74	4·94	0·50	0·39	0·14
28th	775	18·75	1029	4·9	13·99	9·09	0·66	5·13	0·51	0·39	0·12
29th	768	17·50	1031	4·6	14·12	9·52	0·69	4·98	0·54	0·40	0·14
30th	755	19·25	1029	5·1	14·49	9·39	0·69	5·43	0·52	0·40	0·12
31st	761	17·50	1031	4·4	14·05	9·65	0·70	4·59	0·52	0·40	0·12
April.											
1st	781	18·25	1030	4·2	13·68	9·28	0·76	4·97	0·53	0·43	0·10
2nd	775	17·50	1029	4·8	13·95	9·15	0·74	5·13	0·51	0·41	0·10
3rd	786	18·00	1031	4·3	13·62	9·32	0·65	5·20	0·52	0·40	0·12
4th	790	18·75	1029	4·8	14·40	9·60	0·74	5·21	0·53	0·41	0·12
5th	771	18·25	1029	4·9	13·99	9·09	0·75	5·59	0·50	0·34	0·16
6th	816	18·50	1026	5·8	15·20	9·40	0·64	5·01	0·50	0·40	0·10
7th	809	19·25	1029	4·7	13·69	8·99	0·73	5·10	0·51	0·40	0·11
8th	788	18·75	1030	4·8	14·02	9·22	0·66	5·73	0·53	0·42	0·11
9th	802	18·50	..	..	..	..	..	..	..	..	..
10th	822	18·00	..	..	..	..	..	..	..	..	..
11th	792	19·50	..	..	..	..	..	..	..	..	..
12th	811	19·00	..	..	..	..	..	..	..	..	..
13th	815	19·25	..	..	..	..	..	..	..	..	..
14th	812	18·50	..	..	..	..	..	..	..	..	..
15th	812	19·00	..	..	..	..	..	..	..	..	..
16th	824	18·25	..	..	..	..	..	..	..	..	..
17th	827	19·00	..	..	..	..	..	..	..	..	..
18th	840	16·50	..	..	..	..	..	..	..	..	..
19th	814	20·00	..	..	..	..	..	..	..	..	..
20th	840	16·75	..	..	..	..	..	..	..	..	..
21st	812	17·50	..	..	..	..	..	..	..	..	..
22nd	826	17·75	..	..	..	..	..	..	..	..	..

TABLE II.

Rani (Silo Fed).

Date	Daily ration eaten: Ensilaged *sitzkam* leaves	Daily ration eaten: Bhusa	Body weight	Milk yield	Specific gravity at 60° F.	Quantities per 100 grams of milk: Fat	Total solids	Solids not fat by difference	Ash	Lactose	Nitrogen: Total	Nitrogen: Casein	Nitrogen: Soluble by difference
	lb.	lb.	lb.	lb.						*			
March 1924.													
6th	..	..	..	9·50	1029	5·1	16·23	11·13	..	..	0·61	..	..
7th	..	..	..	10·00	1029	5·4	15·86	10·46	..	..	0·58	0·51	0·07
8th	..	..	..	10·50	10·0	5·0	14·44	9·44	..	..	0·53	0·42	0·11
9th	..	..	..	9·0	1028	5·7	14·09	9·29	0·63	..	..	0·48	..
10th	..	..	..	9·50	1031	5·8	15·37	9·57	0·69	..	..	..	..
11th	..	..	762	9·50	1028	5·8	15·20	9·50	0·78	..	..	..	..
12th	1·0	2	772	10·00	1028	5·9	15·53	9·63	0·79	..	..	0·48	..
13th	1·0	2	751	8·50	1028	5·9	15·68	9·78	0·72	..	..	..	..
14th	..	2	769	8·25	1027	6·0	15·15	9·15	0·77	..	..	0·45	..
15th	1·0	1	744	8·50	1027	6·2	14·71	8·51	0·69	..	0·61	0·45	0·16
16th	2·0	1	752	9·0	1029	6·3	15·10	8·80	0·70	..	..	0·49	..
17th	6·0	1	748	8·00	1027	6·3	15·42	9·12	0·75	..	0·57	0·43	0·14
18th	6·0	1	756	8·00	1024	6·3	15·00	8·70	0·73	..	..	0·44	..
19th	7·5	1	748	8·25	1026	6·8	15·38	8·58	0·71	..	..	0·44	..
20th	8·5	1	734	8·00	1027	6·5	14·89	8·39	0·71	..	..	0·46	..
21st	10·5	2	743	7·00	1025	6·0	14·56	8·56	0·70	..	..	0·43	..
22nd	6·5	2	743	7·75	1027	6·3	15·00	8·70	0·75	..	..	0·42	..
23rd	5·0	3	741	7·00	1026	5·8	14·90	9·10	0·76	..	0·55	0·39	0·16
24th	10·5	2	739	7·75	1025	5·8	14·11	8·31	0·76	..	0·54	..	..
25th	11·0	4	745	6·0	1026	6·8	15·07	8·27	0·68	..	..	0·39	..
26th	9·0	4	735	5·75	1026	6·3	14·71	8·41	0·56	..	0·56	0·42	0·14
27th	18·5	2	745	6·25	1026	7·1	15·34	8·24	0·74	4·07	0·57	0·43	0·14
28th	22·0	..	735	6·0	1026	7·4	16·32	8·92	0·72	4·14	0·59	0·43	0·16
29th	13·0	..	744	6·25	1020	7·1	15·01	8·51	0·70	4·06	0·55	0·35	0·20
30th	17·5	..	768	6·25	1025	6·8	15·14	8·34	0·73	4·32	0·55	0·40	0·15
31st	11·5	..	738	5·75	1025	6·3	14·33	8·03	0·67	3·73	Spoiled	0·39	..
April.													
1st	13·5	..	745	7·25	1024	6·6	14·13	7·53	0·70	3·82	0·51	0·41	0·10
2nd	12·0	..	743	5·75	1025	6·9	15·02	8·12	0·68	3·89	0·54	0·40	0·14
3rd	27·5	..	745	6·25	1024	5·9	13·98	8·08	0·62	4·18	0·52	0·37	0·15
4th	22·5	..	736	6·25	1024	6·7	14·87	8·17	0·74	4·21	0·52	0·38	0·14
5th	22·5	..	735	6·50	1021	7·0	15·08	8·08	0·74	4·54	0·53	0·39	0·14
6th	22·0	..	736	6·25	1025	6·2	15·15	8·95	0·70	4·47	0·57	0·43	0·14
7th	16·0	..	742	6·25	1026	6·2	14 87	8·57	0·74	4·25	0·56	0·42	0·14
8th	9·0	..	732	6·25	1024	6·8	15·23	8·12	0·73	4·30	0·54	0·41	0·13
9th	..	..	732	5·75	..	..	..	..	..	..	..	..	..
10th	..	..	774	5·50	..	..	..	..	..	..	..	..	..
11th	..	..	770	6·00	..	..	..	..	..	..	..	..	..
12th	..	..	771	6·00	..	..	..	..	..	..	..	..	..
13th	..	..	759	6·50	..	..	..	..	..	..	..	..	..
14th	..	..	778	6·50	..	..	..	..	..	..	..	..	..
15th	..	..	783	6·00	..	..	..	..	..	..	..	..	..
16th	..	..	800	7·00	..	..	..	..	..	..	..	..	..
17th	..	..	774	6·00	..	..	..	..	..	..	..	..	..
18th	..	..	802	6·50	..	..	..	..	..	..	..	..	..
19th	..	..	767	8·00	..	..	..	..	..	..	..	..	..
20th	..	..	764	6·50	..	..	..	..	..	..	..	..	..
21st	..	..	766	6·25	..	..	..	..	..	..	..	..	..
22nd	..	..	768	6·50	..	..	..	..	..	..	..	..	..

TABLE II—*contd.*

Lelan (Control).

Date	Body weight	Milk yield	Specific gravity at 60° F.	QUANTITIES PER 100 GRAMS OF MILK							
				Fat	Total solids	Solids not fat by difference	Ash	Lactose	NITROGEN		
									Total	Casein	Soluble by difference
	lb.	lb.									
March 1924.											
6th	..	9·50	1029	4·8	14·10	9·30	..	..	0·62	..	..
7th	..	9·00	1029	4·9	14·43	9·43	..	..	0·62	0·50	0·12
8th	..	8·75	1030	4·6	13·87	8·27	0·86	..	0·64	0·48	0·16
9th	..	10,00	1029	4·2	14·33	10·13	0·78	..	..	0·47	..
10th	..	8·75	1031	5·0	14·02	9·02	0·69	..	..	..	..
11th	996	9·50	1030	4·5	13·72	9·22	0·75	..	..	..	..
12th	988	8·50	1029	5·4	14·55	9·15	0·80	..	..	0·49	..
13th	1,016	8·50	1029	5·4	14·87	9·47	0·65	..	..	..	..
14th	1,022	8·00	1029	5·2	14·25	9·05	0·83	..	..	0·48	..
15th	992	8·50	1029	5·4	13·89	8·49	0·71	..	0·64	..	..
16th	1,000	8·00	1029	5·3	13·84	8·54	0·85	..	..	0·51	..
17th	972	8·75	1029	5·3	14·40	9·10	0·69	..	0·57	0·44	0·13
18th	990	8·25	1029	5·2	14·22	9·02	0·69	..	..	0·48	..
19th	1,012	9·00	1028	4·9	13·86	8·96	0·79	..	..	0·46	..
20th	1,008	8·25	1029	5·5	14·43	8·93	0·73	..	..	0·49	..
21st	988	9·00	1029	5·3	14·18	8·88	0·74	..	..	0·49	..
22nd	1,003	8·50	1028	4·8	13·94	9·14	0·78	..	..	0·46	..
23rd	1,028	8·50					Spoiled				
24th	995	9·50	1029	5·3	14·47	9·17	0·85	..	..	0·47	..
25th	994	8·50	1028	5·3	14·58	9·28	0·87	..	..	0·45	..
26th	1,015	8·75	1029	5·3	13·95	8·65	0·70	..	0·56	0·43	0·13
27th	1,023	8·25	1029	5·5	14·01	8·51	0·82	4·29	0·58	0·42	0·16
28th	1,014	8·75	1028	5·3	14·53	9·23	0·77	4·11	0·60	0·46	0·14
29th	1,024	8·00	1029	5·4	14·80	9·40	0·76	4·40	0·63	0·48	0·15
30th	1,027	8·75	1028	5·3	14·48	9·18	0·88	4·78	0·61	0·47	0·14
31st	1,024	8·50	1028	5·2	14·32	9·12	0·75	4·21	0·60	0·45	0·15
April.											
1st	1,009	8·50	1028	5·2	14·20	9·00	0·87	4·58	0·58	0·48	0·10
2nd	1,017	8·25	1028	5·4	14·13	8·73	0·84	4·50	0·58	0·45	0·13
3rd	1,012	8·50	1029	5·2	14·16	8·96	0·76	4·35	0·60	0·44	0·16
4th	1,008	9·00	1028	5·3	14·21	8·91	0·86	4·54	0·57	0·45	0·12
5th	1,010	7·25	1028	5·8	14·90	9·10	0·85	4·62	0·59	0·47	0·12
6th	1,050	9·75	1028	5·2	14·33	9·13	0·75	4·32	0·57	0·45	0·12
7th	1,067	9·00	1027	5·1	13·70	8·60	0·81	4·31	0·59	0·45	0·14
8th	1,036	10·00	1028	5·1	14·28	9·16	0·84	4·66	0·62	0·49	0·13
9th	1,024	8·50	..	..	..	..	..	..	..	..	..
10th	1,036	9·00	..	..	..	..	..	..	..	..	..
11th	1,017	9·50	..	..	..	..	..	..	..	..	..
12th	1,012	8·50	..	..	..	..	..	..	..	..	..
13th	1,021	9·00	..	..	..	..	..	..	..	..	..
14th	1,055	8·25	..	..	..	..	..	..	..	..	..
15th	1,030	9·00	..	..	..	..	..	..	..	..	..
16th	1,020	9·50	..	..	..	..	..	..	..	..	..
17th	1,041	9·00	..	..	..	..	..	..	..	..	..
18th	1,044	7·00	..	..	..	..	..	..	..	..	..
19th	1,046	10·00	..	..	..	..	..	..	..	..	..
20th	1,026	8·00	..	..	..	..	..	..	..	..	..
21st	1,017	7·50	..	..	..	..	..	..	..	..	..
22nd	1,020	7·25	..	..	..	..	..	..	..	..	..

Care was taken in feeding *shisham* leaves to feed it after milking, thus obviating any possible contamination of the milk. Further knowledge might have been obtained if the supply of *shisham* had been sufficient to continue the trials for a longer time, but taking into consideration the fact that the cows had to become accustomed to the new taste of the *shisham* and also the possible seasonal changes in the milk yield the results obtained over this short period indicate that siloed *shisham* can, within certain limits, be fed as a substitute for green fodder, without untoward results on the animals or their milk yield. It is hoped that some further trials may be carried out in this direction.

Table III gives some particulars of the four cows under observation.

TABLE III.

Name of the cow	Age on 5-3-24	Date of calving	Date of service	February average daily yield of milk	March average daily yield of milk	REMARKS
	Yr. Mth.			lb.	lb.	
Nasibo . .	4 9½	11-1-24	5-5-24	18·4	18·1	
Moni . .	4 10½	24-1-24	25-4-24	14·9	18·9	
Rani . .	7 2	3-7-23	25-9-23	9·0	9·6	
Lelan . .	6 10	1-7-23	3-10-23	8·4	9·0	

ANALYTICAL DATA, ETC., CONCERNING *shisham* LEAVES.

The *shisham* leaves were gathered between the 20th and 23rd June 1923, and packed tightly into the silo pit which was 8 feet in diameter and 6 feet deep, and was lined at the sides and bottom with dry straw. The pit was filled level with the ground and pressed tightly down by bullocks and the final level again made up to ground level after which a layer of straw was placed over the top, and about two feet of dry earth over this, so as to provide a slope which would ensure the pit remaining dry in the wet season.

An analysis was made of the fresh leaves when gathered and also at intervals during the course of the siloing, and the results are shown in Table IV.

TABLE IV.

Shisham leaves ensilaged.

Results expressed in c.c. N per 100 grm. dry matter.

	Fresh *Shisham* leaves 21-6-23	16-8-23		30-10-23		17-12-23		31-1-24		24-3-24
		I 20″	II 20″	I 20″	II 20″	I 20″	II 20″	I 20″	II 20″	II 20″
1. Volatile organic acid.	..	8·2	13·5	34·4	72·7	70·5	104·7	70·7	90·5	111·7
2. Amino-acids (with amides of asparagin type).	..	46·3	36·5	53·0	125·7	37·5	57·2	28·8	26·2	30·4
3. Volatile bases .	..	23·1	24·3	17·9	32·5	40·3	57·9	28·5	55·6	73·3
1. Moisture . .	73·11	71·80	73·20	68·03	74·23	..	70·12	..	74·20	75·40
2. Dry matter .	26·89	28·20	26·80	31·97	25·77	..	29·88	..	25·80	24·60
3. Ash . .	5·14	4·50	4·80	4·97	4·28	..	4·78	..	4·70	4·45
4. Fat . .	0·81	0·70	0·88	0·72	0·83	..	0·81	..	0·83	0·85
5. Crude fibre	7·40	9·00	8·68	9·17	8·66	..	7·85	..	7·45	7·50
6. Total nitrogen.	0·69	0·76	0·74	0·79	0·67	..	0·79	..	0·71	0·65
7. True protein nitrogen.	0·57	0·64	0·54	0·42	0·32	..	0·61	..	0·53	0·61
8. Amide nitrogen .	0·02	0·12	0·11	0·13	0·15	..	0·07	..	0·04	0·02

A glance at this table will show that all the ordinary ingredients of the fresh leaves have preserved their figures within certain small limits, and only in the case of the amide nitrogen is there any wide variation, this rising considerably and then afterwards falling.

A good silage should, in particular, retain its moisture and total nitrogen more or less intact, and this has been well achieved in this case.

It was also thought advisable to obtain some information on the volatile organic acids and bases and amino-acids, and the figures obtained during the course of the experiment are also shown.

The amino-nitrogen was estimated by Sorensen's formaldehyde method, and some difficulty was experienced owing to the colour of the solutions, which perhaps introduced some margin of error. It is proposed to repeat these observations during the ensuing year using the Van Slyke method for estimating amino-nitrogen.

The estimations of the volatile acids and bases were carried out according to the method employed by Amos and Woodman (*Jour. Agri. Sc.*, Vol. 12, Pt. 4, 1922).

We note that the volatile organic acids rise continuously during the period under trial, as do the volatile bases also, while the amino-acids rise at first and then fall.

The siloed leaves during the successive samplings had a fresh, pleasant, aromatic smell, were greenish-brown in colour, and were practically free from any mould or decomposition, and it was particularly noted that the mucilaginous substance which was very noticeable in the fresh leaves was absent in the siloed material. This may have been the cause of the original digestive trouble with animals fed on the green leaves, as no such effects were noted with the siloed leaves.

Conclusions.

1. The method of siloing *shisham* leaves as described is a satisfactory one for producing a reserve fodder in times of scarcity.

2. In the period of time employed the animals required to become accustomed to the new taste introduced into the ration and this may account for the small decline in weight, and small fluctuations in milk yield, but as the animals became accustomed to it they ate more, and it may be expected that a longer period of trial would have indicated still further that the siloed leaves could act as an efficient substitute for the basal green fodder in the ration.

3. No deleterious effect whatever was noted in the quality of the milk of the animals fed on the leaves, the yield was fairly maintained, and the animals remained in perfectly good health throughout the period of trial.

In conclusion, the authors wish to express their appreciation of the valuable assistance rendered by Mr. Stewart, Professor of Agriculture, in providing the animals, and to Bh. Balwant Singh Mahon, B.Sc., Research Assistant, for assistance in carrying out the analysis.

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