

Raising Calves with Soyabeans Milk

By

Major T. MURARI, -B. Sc., (Oxon), F. L. S., F. R. S. A.,

Glycine max (Linn) Merr. usually known as Soyabean has been grown in this country for many centuries. It is known by various vernacular names in various parts of India. The following names are noted by Piper and Morse for varieties found in India :—

<i>Name</i>	<i>Locality</i>
An-ing, Tzuda, Kije ...	Naga Hills, Assam
Patani-jokra ...	Assam
Bhatwas } ...	United Provinces
Bhutras }	
Patani ...	India
Bhatnas ...	Nepal
Bhetmas } ...	Bengal
Gari-kalai }	
Chlai }	
Bhut ...	Punjab
Bunce ...	Ceylon
Khujoon ...	North west Frontier Province
Disomhorac ...	Santhal
Silliangdum ...	Sikkim

In spite of the extensive area under cultivation of this crop in this country the full value of the crop is not well known in this country and is not so well exploited as in China and Japan. Of late many experiments have been conducted in the country, for example, the work conducted by Dr. Subramaniam at Bangalore for human consumption is note-worthy.

While it is agreed that soyabean milk is a useful substitute for milk there are experiments by Basu of Dacca University which indicate that calcium deficiency has to be made up. Again work in Dacca and Lahore Universities and Coonoor Nutrition Institute indicate that soyabeans is not superior to any of the pulses grown on a large scale in India.

The object of the experiments at Hosur and Lam Farms was to find a suitable milk substitute for ration to calves. To raise a calf not less than 400 lbs. of milk will be required. If we can successfully raise calves with less of cows milk, the milk saved would be available for human consumption. It would mean more milk available per cow for sale and may just turn the profit and loss account in favour of the dairy industry. It must be borne in mind that in addition to the soyabean milk various

products can be made from the residue, but in animal husbandry it can be used for feeding adult stock of all varieties with advantage. While the soyabean milk can be fed to calves the residue is rich enough to replace cake in the ration.

Feeding trials with Soyabean milk were conducted at the Livestock Research Station, Hosur and Livestock Research Station, Lam, Guntur. The method of preparation of soyabean milk is as follows:—

Finely ground flour is soaked in water over night. Seven or eight times the quantity of water is boiled and the soaked flour gradually added. It is cooked for 7 to 10 minutes and strained through cheese cloth. The residue should be washed through a little hot water. The liquid portion is the milk; the colour depending on the variety of seeds used. As the milk is deficient in fat and vitamins upto $\frac{1}{2}$ oz. shark liver oil is added.

When feeding soyabean milk, it must be gradually introduced to the calf. At first $\frac{1}{2}$ lb. of soyabean milk should replace $\frac{1}{2}$ lb. of cows milk and gradually the soyabean milk is increased each week replacing an equal quantity of cows milk. In case a calf shows any intestinal disorders soyabean milk may be reduced for some time.

The soyabean milk and its residue were analysed by the Agricultural Chemist at Coimbatore and the results are given below:—

Heads of analysis	Lab. No. 335/46-47. Soyabean seed %	Lab. No. 340/46-47. Soyabean flour %	Lab. No. 341/46-47. Soyabean milk %
Moisture	... 10.59	10.39	93.74
Ash	... 6.29	6.61	0.63
Crude proteins	... 38.90	38.54	3.04
Ether Extractions	... 14.22	14.29	0.82
Crude fibre	... 4.87	5.53	0.05
Carbo-hydrates	... 25.13	24.64	1.72
Total	... 100.00	100.00	100.00
Insolubles	... 0.63	1.00	0.012
P ₂ O ₅	... 1.75	1.76	0.162
CaO	... 0.54	0.48	0.040
Acid value	... 6.84 mgms. of KOH per gm. of fat. 3.39 mgms. of KOH per gm. of fat.		

Calves about 4 weeks old were selected as far as possible of similar ages in each of the breeds. They were divided into four groups:—

Group I.	Group II.	Group III.	Group IV
Soyabean milk less milk with Shark liver oil.	Soyabean milk less milk with Shark liver oil (milk to be reduced gradually).	Milk alone.	Control on feed in the Dairy.

The preliminary experiments were conducted for a period of eight weeks. They could not be either prolonged or repeated as there was not sufficient quantities of soyabeans available, but soyabeans is being grown on the farm for feeding calves in future.

The result of the experiments conducted at Livestock Research Stations, Hosur and Lam Farm Guntur are given below:—

Statement showing the comparative weights of calves fed on Soyabeans Milk

Part I.

I Group							II Group						
Soyabean milk and Shark liver oil.							Soyabean milk as required and Shark liver oil.						
Breed.	Sex of calves.	Calf number.	Date of birth.	Weight at commencement of the experiment.	Weight at the termination of the experiment.	Difference, increase in weight.	Breed.	Sex.	Calf number.	Date of birth.	Weight at commencement.	Weight at the termination.	Difference, increase in weight.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Calves 5 to 8 weeks.</i>													
Kangayam	Heifer	589	10-9-'46	74	108	34	Kangayam	Heifer	591	12-9-'46	70	91	21 lbs.
Hallikar	Heifer	391	12-9-'46	80	111	31	Kangayam	Heifer	590	10-9-'46	49	61	12 lbs.
<i>Calves 8 to 12 weeks—No calves were available.</i>													
<i>Calves 12 to 16 weeks.</i>													
Kangayam	Heifer	578	19-6-'46	143	182	39	Kangayam	Bull	579	19-6-'46	137	177	40 lbs.
Sindhi	Heifer	876	22-6-'46	105	140	35	Sindhi	Bull	878	26-6-'46	110	140	30 lbs.
<i>Calves above 16 weeks.</i>													
Sindhi	Bull	860	20-5-'46	142	174	32	Sindhi	Bull	862	23-5-'46	165	208	43 lbs.
Kangayam	Bull	576	15-6-'46	133	168	35	Kangayam	Heifer	577	17-6-'46	167	205	38 lbs.

* This had a swelling on the dewlap.

Part II.

III Group Milk as required.							IV Group Controls.						
Breed.	Sex.	Calf number	Date of birth.	Weight at commencement.	Weight at termination.	Difference, increase in weight.	Breed.	Sex.	Calf number.	Date of birth.	Weight at commencement.	Weight at termination.	Difference, increase in weight.
15	16	17	18	19	20	21	22	23	24	25	26	27	28
<i>Calves 5 to 8 weeks.</i>													
Kangayam	Bull	592	14-9-'46	65	85	20 lbs.	Kangayam	Bull	594	17-9-'46	80	105	25 lbs.
Kangayam	Heifer	593	16-9-'46	75	105	30 lbs.	Kangayam	Bull	595	21-9-'46	68	102	34 lbs.
<i>Calves 8 to 12 weeks—No calves were available.</i>													
<i>Calves 12 to 16 weeks.</i>													
Hallikar	Heifer	377	24-6-'46	167	215	48 lbs.	Hallikar	Heifer	378	29-6-'46	141	173	32 lbs.
Kangayam	Heifer	580	27-6-'46	105	140	35 lbs.	Kangayam	Heifer	581	30-6-'46	129	165	36 lbs.
<i>Calves above 16 weeks.</i>													
Sindhi	Bull	871	13-6-'46	138	175	37 lbs.	Hallikar	Heifer	376	10-6-'46	130	145	15 lbs.
Hallikar	Heifer	375	8-6-'46	195	235	40 lbs.	Kangayam	Bull	574	11-6-'46	155	198	43 lbs.

Though the Lam figures look attractive they are not to be taken as entirely reliable because the animals were not actually weighed. Nevertheless the results are valuable as a whole in that the animals did not suffer adversely. The Hosur figures are more valuable because they show certain difficulties in the experiment.

These feeding trials have shown that where calves are looked after carefully soyabean milk can be used as a substitute for milk for calves above one month old, thus soyabean milk can thus be considered as a desirable substitute. It would mean that almost 200 lbs. more milk per cow can be made available to human consumption without the growth of calves being adversely affected.

N. B.— This paper has been released with the express desire of Dairymen who wish to know if there are any suitable substitute for milk in calf rearing. Work is in progress and further communications will follow in due course. The experiment at Hosur was conducted by Sri P. Ananthan Nayar, Dairy Manager and Mr. K. Thomas Benjamin, Dairy Manager, Livestock Research Station, Hosur and at Lam by Sri G. S. Srinivasan, Veterinary Assistant Surgeon.

Statement showing the rate of growth of calves fed on soyabean milk, at Guntur.
Experiment commenced on 6-11-1947.

Group.	Number of calf.	Sex.	Date of birth.	Sire.	Dam.	Weight before experiment.	Weight at the end of								Remarks.
							first week.	second week.	third week.	fourth week.	fifth week.	sixth week.	seventh week.	eighth week.	
Group I	784	Bull	23-9-1947	298	329	83 lb.	90 lb.	93 lb.	97 lb.	101 lb.	105 lb.	111 lb.	116 lb.	120 lb.	Weights are calculated from measurements only, for want of a weighbridge.
"	776	Bull	9-8-1947	298	300	115 "	120 "	124 "	128 "	134 "	139 "	143 "	148 "	154 "	
"	771	Heifer	1-7-1947	315	290	130 "	138 "	141 "	145 "	150 "	154 "	159 "	164 "	170 "	
Group II	785	Bull	24-9-1947	249	324	82 "	88 "	93 "	97 "	101 "	106 "	112 "	117 "	122 "	
"	777	Bull	16-8-1947	315	342	112 "	115 "	119 "	123 "	128 "	134 "	142 "	148 "	154 "	
"	772	Bull	6-7-1947	315	310	133 "	140 "	143 "	147 "	155 "	162 "	166 "	174 "	180 "	
Group III	786	Heifer	4-10-1947	298	292	83 "	89 "	93 "	97 "	104 "	110 "	116 "	122 "	129 "	
"	774	Heifer	20-7-1947	315	307	125 "	130 "	131 "	134 "	141 "	148 "	154 "	160 "	167 "	
"	780	Bull	7-9-1947	249	321	86 "	90 "	96 "	100 "	108 "	115 "	121 "	126 "	133 "	
Group IV	787	Bull	11-10-1947	298	337	77 "	81 "	84 "	88 "	94 "	99 "	105 "	110 "	116 "	
"	783	Heifer	23-9-1947	298	309	77 "	83 "	87 "	90 "	96 "	102 "	108 "	115 "	123 "	
"	775	Heifer	9-8-1947	315	353	90 "	96 "	99 "	103 "	107 "	115 "	121 "	126 "	132 "	

Calf numbers 784, 771 777 and 774 showed digestive troubles in the beginning. These responded to treatment and were all right in two days except calf No. 771 which took nearly four days to become normal.