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# THE NUTRITIVE VALUES OF INDIAN CATTLE FOODS AND THE FEEDING OF ANIMALS

BY

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the important vitamins and fatty acids essential for the health of an animal are also supplied through the fats in the diet.

*Crude fibre.*—The cell-walls and woody fibre of all plants go under the category of fibre. Naturally this constituent is the least digestible part of the feed. The work and expenditure of energy in chewing and digesting such material make its nutritive value still less. But the digested fraction is used by the animal body exactly like the soluble carbohydrates.

*Soluble carbohydrates (nitrogen-free extract).*—Starch and sugar form the main ingredients of this class of substances. These are used by the animal to produce heat, energy and fat in the body. They are also the source of the fat and sugar in milk. Excess of carbohydrates is reserved by the body in the form of depot fats.

*Mineral matter.*—The minerals available in the feed of an animal are used for the making and repair of bones, digestive juices, blood, etc., and also form the source of the large amounts of minerals secreted through the milk. Not only minerals as a whole but also individual ingredients are found to be important factors in the adequate nutrition of animals. Growing animals and milch cattle have a great need of minerals, such as lime, phosphorus, etc., and have often to be provided with an extra amount of common salt and bone flour added to the ordinary farm ration.

*Vitamins.*—Besides the above, there are certain substances known as vitamins, which are considered to be essential for the proper nutrition of farm stock. Of these, the more important ones from the point of view of cattle nutrition are vitamins A and D, because these have to be supplied to the animals through their feed, but vitamins B and C can be synthesized in the ruminant body. If sufficient green pasture is fed to animals, the need for vitamins A, B, C, D and E is satisfied.

Although the chemical composition of a food-stuff is not a criterion of its feeding value, it forms the basis for judging its nutritive value. Appendix I gives the analysis of a number of food-stuffs for their various ingredients. The absence of representative data for the vitamin contents of the various feeding stuffs is responsible for the deletion of that item from the tables of analysis.

The value of a food-stuff depends upon the proportion of it which is digested. The ratio of the digestible portion to the total amount fed represents the co-efficient of digestibility of the particular feed or of the mixture as it is used in a feeding experiment. Digestibility determinations have been carried out for several of the feeding stuffs available in India and the relative co-efficients of digestibility of the various ingredients are recorded in Appendix II. For the convenience of users, the co-efficients have been rounded to the nearest integer.

From the data given in Appendices I and II, the digestible nutrients per 100 lbs. of feedingstuff have been calculated and are tabulated in Appendix III. This table gives, in addition, the nutritive ratios and starch equivalent values of all the common feeding stuffs experimented with in India. These together with the digestible crude protein contents are the figures which enable us to find out whether a diet provides a sufficiency of the major ingredients involved in nutrition. It would be appropriate, at this stage, to explain what these figures connote.

*Digestible crude protein.*—Opinion differs as to whether the non-protein nitrogen in feeding stuffs has a nutritive value equal to that of the true protein or only half as much. Hence it has been thought desirable to confine the data given in this bulletin to the digestible crude protein and not to the protein equivalent which assumes only half the nutritive value of true protein for the amide fractions.

Although protein can replace the carbohydrates in the dietary for purposes of heat production, this is never done in practice because nitrogenous material is always found to be costlier than carbohydrate material.

*Nutritive ratio.*—This is the ratio of digestible protein to the non-nitrogenous nutrients in a food-stuff. In arriving at this ratio it is reckoned that 1 lb. of digestible fat gives as much heat as 2.25 lbs. of starch. By dividing the sum of the digestible carbohydrates and the digestible fats multiplied by 2.25 by the digestible crude protein content, the nutritive ratio is obtained, representing the number of lbs. of heat producing substances per 1 lb. of protein. Protein-rich food-stuffs have a narrow nutritive ratio while a carbohydrate-rich food-stuff has a wide nutritive ratio.

*Starch equivalent.*—The calculation of the available energy in a feeding stuff is a little more complicated. 1 lb. of fat is known to produce on combustion as much heat as 2.25 lbs. of starch, sugar or fibre and 1 lb. of pure protein as much as 1.25 lbs. of starch. The amides give out only the equivalent of 0.6 lbs. of starch for every lb., so that 1 lb. of crude protein is equivalent to about 0.94 lb. of starch. From these values it is possible to calculate how many pounds of pure starch have the same value for heat production as 100 lbs. of material, such as hay, straw, grains or oil-cakes. When a food-stuff is eaten by an animal there is a certain amount of energy spent in what may be called the work of digestion. This expenditure of energy is great in the case of coarse fodders and may amount to about 50 per cent of the gross energy of the feed, while in the case of concentrates it may be only 10 per cent. No doubt the heat developed in this work of digestion may be available as heat for keeping up the body temperature but it cannot be used for productive purposes. After deducting this wastage from the gross digestible energy of the feed, whatever is available actually to the animal for production purposes is called the net energy which is expressed in the Armsby system with therms as the unit, but Kellner expressed it in terms of the energy given out by 1 lb. of digestible starch as the unit and called it the starch equivalent. In practice, the starch equivalent can be converted into net energy by multiplying the S. E. value by 1.071. For instance, if the starch equivalent of, say, wheat straw is given as 21.9 lbs., it means that 100 lbs. of wheat straw when fed will make available to the animal as much energy as 21.9 lbs. of digestible starch will do for purposes of production.

*Principles of rationing.*—The ration of an animal may be divided for convenience into two parts, one for maintenance and the other for production purposes. The maintenance ration is that portion of the diet which just enables the animal at rest to carry on the essential processes of life, such as breathing and circulation of blood, without either gain or loss of weight. This to a certain extent is dependent upon the live-weight of the animal, although not strictly proportional to it. As, however, no animal is kept in a farm in a state of non-production, the requirements for maintenance form only a convenient basis for the calculation of rations for productive purposes. Whatever is supplied to the animal over and above its maintenance requirement is available for production, such as for growth or fattening, for production of calf, for production of milk or for output of work.

*Growth.*—This is a most important form of live-stock production, because it is the foundation on which the other forms of production such as beef, milk or work rest. Within the limits set up by hereditary factors, it is the adequate growth of the young one that determines the possibilities of the animal as a producer. If

the growth of a young animal is retarded, it will result in a permanent and substantial loss of production by the animal and its progeny.

The requirements for growth and those for maintenance of the adult animal are very different. For a calf of the same body-weight as a mature bullock at rest, the total nutrient requirements are far more than that of the bullock. Since growth consists largely of an increase in the sizes of the muscles, protein tissues and the skeleton, large amounts of proteins, minerals and vitamins must be provided.

*Reproduction.*—For a mother in calf, adequate provision must be made for the growth of the foetus as well as to keep the dam fit to give a liberal supply of good milk on calving. This extra provision need, however, be made only during the last third of the period of pregnancy. If the mother is under-nourished or is on an unbalanced ration, the calf which is born is weak and under-sized and the milk yield of the cow low and poor in vitamin content. Lack of an adequate supply of vitamin-A often results in abortion or birth of weak or blind calves.

*Fattening.*—Growth and fattening are two complementary aspects of meat production. The term fattening implies the deposition of large quantities of tissue fat but this is not the sole object in economic meat production. The aim in meat production is to acquire the maximum amount of lean meat, the quality of which is simultaneously improved by the storage of fat in the muscle and protein tissues, so that the maximum growth synchronises with the optimum fattening when the animals reach maturity. The requirement of animals for growth is so exacting that unless an abundant supply of net energy is provided in the feed, in excess of the requirement for normal growth, no fattening but only growth will take place.

The rate of conversion of food-nutrients into body-fat is higher in the case of young ones than with mature animals. Hence if fattening is retarded in the earlier stages it will make the cost of meat production very high in the later stages. Although fattening as such requires very little protein, it is necessary to increase protein supply also in order to effect rapid gains. Further, the total digestibility of a ration is greatly reduced if the proportion of protein in it is very small. Minerals and vitamins should also be adequately provided, particularly to growing animals, to avoid any unthriftiness in the fattened animals.

*Milk production.*—Milk is the most widely used product of live-stock. The composition of milk differs from that of the carcass or the blood. It is specially rich in protein, lime and phosphorus and contains large quantities of lactose, fat and vitamins. It is obvious that the animal must be provided with a sufficient quantity of all these ingredients, in addition to its maintenance requirements, in order to be able to cope with the continuous drain from its body in the form of milk.

The cow converts the food proteins into milk protein very efficiently. About 1.25 times the quantity secreted in the milk will satisfy its requirements for milk production, exclusive of the maintenance allowance. Although animals have the capacity to convert the carbohydrates in the feed for the purpose of milk fat production, it is easier for them to convert the fat in their feed. So it is advisable that the concentrate ration of cows should contain at least 4 per cent fat. Minerals and vitamins in the feed of lactating animals are very important.

*Work production.*—Increased muscular effort naturally results in a large amount of nutrients being oxidized in the system. It is known that all the organic constituents of a food are capable of being utilized as sources of energy. However, when

the supply of food is adequate, a working animal first draws upon the carbohydrates and fats of the feed. If the supply is insufficient, the body-fat is used for the purpose and in the last resort the muscles and other protein tissues are attacked. But so long as there is an abundant supply of carbohydrates in the feed, a mature animal at work needs very little more protein than while at rest. In this respect, work production differs radically from growth or milk production.

The nutrient requirements of working animals depend upon the amount of labour performed. The heavier the work the greater should be the proportion of easily digestible carbohydrates in the ration. About one-fourth to one-third of the net energy supplied for production purposes is converted into actual useful work. Calculating on the basis of the total gross energy intake per day, an animal working for a full day yields 9 per cent. of the intake as actual work. Many factors are known to influence the efficiency of utilization of the feed by a working animal, such as the breed, the speed of working, fatigue and practice.

*Practical scales of feeding.*—Extensive studies have been made in other countries on the requirements of various classes of live-stock by means of feeding experiments. Investigations carried out in this country show that the adoption of foreign standards always leaves a margin of safety, so far as Indian cattle are concerned. The figures for maintenance, growth, fattening and milk production are taken from Morrison's feeding standards. In all cases the averages of the maximum and the minimum recommended by Morrison have been adopted. The figures given for the Net Energy have been converted into corresponding Starch Equivalent Values. The data for work production are computed from Armsby's figures. It may be added that for all practical purposes these data agree with the feeding scales recommended in the bulletins issued by the British Ministry of Agriculture.

#### COMPUTATION OF RATIONS

(a) *Dry matter requirement.*—The live-weight of the animals and the nature of production should be known in order to compute a ration. It is found that animals will eat about 2.0-2.5 lbs. of dry matter per 100 lbs. body-weight. Although the major portion should be supplied by bulky feed, sufficient concentrates should be fed to bring the nutrients up to the standard required.

(b) *Maintenance requirement.*—In general it can be stated that the maintenance requirement of a 1,000 lb. animal is about 6.0 lbs. starch equivalent including 0.6 lb. digestible protein. Feeding standards are given in Table I.

TABLE I

*Nutrients required for maintenance of dairy cows per head per day (based on Morrison's data)*

Live-weight	Digestible protein	Starch equivalent
lb.	lb.	lb.
500	0.338	3.05
600	0.399	3.58
700	0.458	4.09
800	0.516	4.59
900	0.570	5.08
1,000	0.625	5.57

(c) *Growth*.—It is customary to assume that for normal growth, say, at the rate of 1 lb. live-weight per day, the additional requirement, besides that for maintenance, is about 2.0-3.0 lbs. starch equivalent. The total nutrients required by growing dairy animals per day are given in Table II.

TABLE II

*Nutrients required for growing dairy cattle per head per day (based on Morrison's data)*

Live-weight	Digestible protein	Starch equivalent
lb.	lb.	lb.
100	0.32	1.8
150	0.47	2.4
200	0.57	3.3
250	0.66	3.9
300	0.73	4.5
400	0.85	5.3
500	0.93	6.1
600	1.00	6.8
700	1.07	7.4
800	1.13	8.0
900	1.19	8.7
1,000	1.25	9.2

(d) *In-calf cow*.—The requirement of a cow in calf, in excess of its maintenance allowance as given in Table I, is only 1.0 lb. starch equivalent including 0.3 lb. digestible protein.

(e) *Milk production*.—For production of milk the approximate requirements are 0.25-0.4 lb. starch equivalent and 0.04-0.06 lb. digestible protein per pound of milk depending on the fat content. The detailed requirements for production of milk with varying fat contents are given in Table III. Milch cattle will eat one or two pounds more dry matter than other animals.

TABLE III

*Nutrients required for milk production per pound of milk to be added to the maintenance allowance (based on Morrison's data)*

Fat per cent in milk	Digestible protein	Starch equivalent
	lb.	lb.
3.0	0.040	0.233
4.0	0.045	0.275
5.0	0.051	0.316
6.0	0.057	0.357
7.0	0.063	0.398

(f) *Working animals.*—The ration for work production is given in Table IV for heavy, medium and light work. All that is necessary is to provide extra nutrients required for the kind of work to be performed, in addition to the maintenance requirement. It may be mentioned here that the work done by an animal in gathering its food from pasture land costs the animal an appreciable amount of energy. On poor pasturage it is 3·0 lb. S. E., on average pasture land it is 2·0 lb. S. E. and on richly grown pasture it is only 1·0 lb. S. E.

TABLE IV

*Nutrients required for work production per 1,000 lb. body-weight to be added to the maintenance allowance (based on Armsby's data)*

Nature of work	Digestible protein	Starch equivalent
	lb.	lb.
Heavy (8 hours a day)	1·5	13·12
Medium (4 hours a day)	0·9	6·56
Light (2 hours a day)	0·5	3·29

(g) *Fattening.*—Data are included in Table V for the fattening of cattle. In this table the consolidated requirements per head per day are given for maintenance plus rapid growth, say, at the rate of 2 lbs. per day.

TABLE V

*Nutrients required for growing beef cattle fed liberally for rapid growth (based on Morrison's data)*

Live-weight	Digestible protein	Starch equivalent
lb.	lb.	lb.
100	0·32	1·5
150	0·48	2·5
200	0·59	3·5
250	0·70	4·1
300	0·78	4·9
400	0·93	5·8
500	1·02	6·6
600	1·10	7·5
700	1·17	8·0
800	1·25	8·9
900	1·31	9·6
1,000	1·37	10·2

## SOME TYPICAL EXAMPLES

In the following paragraphs the calculation of some typical rations are given in order to illustrate the method of using the various tables. The proportions of different food-stuffs given in the rations are not based on any experimental work.

(1) Calculation of ration for a cow weighing 800 lbs. and yielding 20 lbs. of milk with a fat-content of 3·5 per cent.

The available food-stuffs for the purpose are wheat *bhusa*, *juar* silage and green guinea grass as roughage and groundnut cake, barley, wheat bran and gram husk as concentrates.

Tables I and III give the relative requirement figures for this cow. It is observed that for maintenance the animal requires 0·516 lbs. digestible protein, 4·59 lbs. starch equivalent and will eat approximately 20·22 lbs. dry matter.

On referring to Appendix III, it is seen that the maintenance requirement is satisfied by the following feeds :—

		Dry matter	Digestible protein	Starch equivalent
Wheat <i>bhusa</i>	9 lbs.	8·1	..	1·99
<i>Juar</i> silage	10 lbs.	3·0	0·07	0·87
Guinea grass	12 lbs.	3·0	0·09	0·92
Groundnut cake	1 lb.	0·9	0·42	0·68
	Total	15·0	0·58	4·46

Referring to Table III, it is found that the extra requirements for 20 lbs. milk production are 0·85 lbs. D. P. and 5·0 lbs. S. E. These have to be supplied by about 7 lbs. of concentrate for which the following mixture can be prepared :—

		D. M.	D. P.	S. E.
Barley	4½ lbs.	4·0	0·36	3·44
Groundnut cake	1 lb.	0·9	0·42	0·68
Wheat bran	1 lb.	0·9	0·11	0·51
Gram husk.	1 lb.	0·9	..	0·42
	Total	6·7	0·89	5·05

The two separate rations can now be combined and will give a total dry matter of 21·7 lbs., digestible protein 1·47 lbs. and starch equivalent 9·51 lbs. This agrees with the requirements of the animal.

In practice it is usual to make the animal eat all the concentrate and as much as possible of the green roughage. The dry roughage is given in slight excess and the animal adjusts its own requirements.

(2) Calculation of a ration for an in-calf cow weighing 600 lbs.

The feeds available are rice straw, guinea grass and rape cake. The maintenance ration from Table I is 0·399 lbs. D. P. and 3·58 lbs. S. E. The animal will



consume about 12-15 lbs. dry matter. The following materials give a maintenance ration :—

		D. M.	D. P.	S. E.
Rice straw	10 lbs.	9.0	...	1.88
Guinea grass	14 lbs.	3.5	0.10	1.08
Rape cake	1 lb.	0.9	0.28	0.74
Total		13.4	0.38	3.65

The animal in addition requires 0.3 lbs. D. P. and 1.0 lbs. S. E. for the purpose of production which are satisfied by  $1\frac{1}{2}$  lbs. rape cake yielding 1.13 lbs. dry matter, 0.37 lbs. digestible protein and 0.93 lbs. starch equivalent.

(3) Calculation of ration for a growing heifer weighing 500 lbs.

The available food-stuffs are *anjan* hay, green berseem, oats and *sarson* cake. The total requirements as given in Table II are 0.93 lbs. D. P. and 6.1 lbs. S. E. The animal will consume about 10-12 lbs. dry matter. The ration can be computed as follows :—

		D. M.	D. P.	S. E.
<i>Anjan</i> hay	7 lbs.	6.3	0.13	1.83
Green berseem	5 lbs.	1.0	0.14	0.49
Oats	4 lbs.	3.6	0.28	2.64
<i>Sarson</i> cake	$1\frac{1}{2}$ lbs.	1.35	0.41	1.05
Total		12.25	0.96	6.01

(4) Calculation of the ration for a bullock weighing 800 lbs. and doing medium work.

The available food-stuffs are spear grass hay, green berseem, *til* cake and maize. The requirements for this purpose can be obtained from Tables I and IV. It will be found that 1.236 lbs. D. P. and 9.84 lbs. S. E. are required. The animal will eat roughly 16-20 lbs. of dry matter. The requirements can be met from the following ration :—

		D. M.	D. P.	S. E.
Spear grass hay	9 lbs.	8.10	..	2.50
Green berseem	16 lbs.	3.20	0.45	1.57
Maize	6 lbs.	5.40	0.44	5.04
<i>Til</i> cake	1 lb.	0.90	0.38	0.75
Total		17.60	1.27	9.86

*Some common concentrate mixtures.*—An usual practice in large farms is to provide a roughage ration which together with a small protein supplement, if necessary, forms the maintenance ration for the animals. A concentrate mixture is then fed to individual animals in proportion to their production, such as milk yield. The concentrate mixture which thus in reality is the production ration is made up of several different materials because it is known that single concentrate feeds are not satisfactory as the amino-acid make-up may be defective. For the sake of

convenience some concentrate mixtures are given below. One pound of each mixture is of equal value and is sufficient for 2.5 lbs. of milk production containing 4.5 per cent of fat.

	Per cent	
(1) Cotton seed meal . . . . .	25	} Contains per lb. of mixture 0.13 lbs. D. P. and 0.77 lbs. S. E.
Wheat bran . . . . .	20	
Maize . . . . .	55	
(2) Rape cake . . . . .	25	} Contains per lb. of mixture 0.14 lbs. of D. P. and 0.74 lbs. S. E.
Cotton seed . . . . .	35	
Wheat bran . . . . .	10	
Barley . . . . .	30	
(3) Rape cake . . . . .	30	} Contains per lb. of mixture 0.13 lbs. of D. P. and 0.74 lbs. S. E.
Barley . . . . .	50	
Oats . . . . .	20	
(4) Groundnut cake . . . . .	15	} Contains per lb. of mixture 0.14 lbs. D. P. and 0.74 lbs. S. E.
Gram . . . . .	40	
Maize . . . . .	40	
Gram husk . . . . .	5	
(5) Gingelly cake . . . . .	15	} Contains per lb. of mixture 0.14 lbs. D. P. and 0.72 lbs. S. E.
Gram . . . . .	40	
Barley . . . . .	40	
Rice bran . . . . .	5	
(6) Groundnut cake . . . . .	10	} Contains per lb. of mixture 0.13 lbs. D. P. and 0.73 lbs. S. E.
Cotton seed . . . . .	20	
Rice bran . . . . .	10	
Maize . . . . .	30	
Gram . . . . .	30	

*Legume hay as substitute for concentrate.*—The above mixtures or a suitable variation of any of them can be used with ordinary roughages, such as *anjan* hay, *dhub* grass, green maize, etc., but where leguminous hay such as berseem or lucerne is available, it is possible to cut down a considerable part of the concentrate from the feed, specially with poor or medium producers. A suitable ration with some leguminous hay as the main source of protein can be prepared by using the tables and appendices given in this publication. It is however not desirable to withhold completely cake or grain from a ration as this is likely to have adverse effect in the long run.

*Mineral supplement.*—It has been stated previously that growing animals and milch cattle need a large amount of minerals, but no addition of minerals has been made in the rations for which calculations have been given above. The usual practice in large farms is to provide blocks of rock salt which can be licked by animals. Otherwise, an approximate amount of 1 oz. common salt is given to adult animals in their feed. Besides this, both for the growing and milch animals it is often necessary to provide some phosphorus and lime-rich mineral mixture. This is specially true where leguminous crops, which are usually rich in lime, are not fed regularly. Most of the concentrates are rich in phosphorus but poor in lime and as such, unless leguminous fodder or good quality hay are available, the dairy ration is likely to be badly balanced in regard to lime and phosphorus. A cow of average weight requires for maintenance  $1\frac{1}{2}$  oz. lime (CaO) and  $\frac{4}{5}$  oz. phosphoric acid ( $P_2O_5$ )

daily and for a production of 10 lbs. of milk, another  $\frac{1}{2}$  to  $\frac{3}{4}$  oz. lime and  $\frac{2}{3}$  to 1 oz. phosphoric acid. These are rough estimates. In Appendix I, the mineral analysis is given of the common Indian feeding stuffs, from which it is easy to calculate whether a ration contains a sufficient amount of the materials or not. In general, it is found advisable to give one oz. of a good mineral mixture to growing animals, and about 2 ozs. of the mixture to lactating animals per day depending on the milk yield. The mineral mixture may be prepared as follows:—Common salt 50 per cent, finely ground chalk 25 per cent and sterilized feeding bone flour 25 per cent. This mixture can be fed at a level of about 3 per cent of the concentrate feed, no extra common salt being necessary. In some farms, a more complicated mixture is used and has given good results with heavy milking animals. The mixture has the following approximate composition:—

	Per cent
Sterilized bone flour . . . . .	50
Finely ground chalk . . . . .	23
Common salt . . . . .	20
Sulphur . . . . .	5
Oxide of iron . . . . .	2
	—
	100
Add potassium iodide . . . . .	4 ozs.
	—
Total . . . . .	100 lbs. 4 ozs.
	—

This mixture is fed at the rate of about 2 per cent of the concentrate feed. Blocks of rock salt are kept in the farm which supply additional common salt to the animals if required.

*Vitamin supplement.*—The straw and hay, as commonly available in India, are practically devoid of vitamin A potency. This is also the case with most of the concentrates. For this reason, avitaminosis-A in a mild form is widely prevalent and occasional instances of this trouble, such as intra-uterine blindness, ophthalmia in growing animals, abortion and sterility are found in many places. The only practical method of remedying this defect in the ration is to provide for green grazing, failing which, a suitable supplement of green feed, 8-10 lbs. daily, should be given to growing, in-calf and lactating animals.

*Feeding of green grass and silage.*—There is another important point in green grass to which attention may be drawn here. It may be observed from Appendix III that some of the hays which are nothing but field-dried grass supply hardly any digestible proteins to the animals. The same materials in the green state, however, have a fairly high nutritive value including a good amount of digestible protein and this is the reason why during the monsoon period when grass grows abundantly, emaciated indigenous cattle pick up condition quickly on grass alone. Thus it has been found possible to maintain non-producing animals in prime condition for a large part of the year in areas where good quality *anjan* or *dhub* grass grows. When the grass is allowed to become over-ripe, much of its nutritive value is lost, but converting the green fodder into mixed silage preserves the food value

considerably. When green feed is scarce, a good silage is of great value to milch cattle.

The following publications may be consulted for further information :—

1. *Feeds and Feeding* by F. B. Morrison, The Morrison Publishing Company, Ithaca, New York, 20th Edn., 1937.
  2. *Rations for Live-stock* by T. B. Wood, Ministry of Agriculture and Fisheries, London, Bulletin No. 48, 1936.
  3. *The Feeding of Dairy Cows* by J. Mackintosh, Ministry of Agriculture and Fisheries, London, Bulletin No. 42, 1932.
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## Average percentage composition of Indian

Serial No.	Name	Place of origin	Total ash	Ash sol. in HCl.	Organic constituents			
					Crude protein	Carbohydrates		Ether extract
						Fibre	Nitrogen free extract	
<b>GREEN FEEDS</b>								
<i>Bajra (Pennisetum typ-hoideum).</i>								
1	„ just before flowering.	Punjab	14.70	10.90	16.25	28.23	38.79	2.03
2	„ maximum flowering	„	11.30	8.61	12.56	28.45	45.72	1.97
3	„ milk stage	„	9.21	6.28	10.56	27.96	50.15	2.12
4	„ dough stage	„	8.21	5.40	8.81	24.90	56.22	1.86
5	„ ripe stage	„	7.68	5.09	8.88	23.96	57.74	1.74
6	Barley ( <i>Hordeum vulgare</i> ).	„	11.37	9.19	11.47	31.85	43.45	1.86
7	Berseem ( <i>Trifolium alexandrinum</i> ).	Bihar	20.25	12.99	15.45	26.06	35.88	2.36
8	„ maximum	Punjab	18.96	14.43	23.10	30.87	46.94	2.78
9	„ minimum	„	8.49	7.07	13.99	19.47	33.24	1.39
10	„ average	„	14.16	12.00	17.35	25.91	40.69	1.89
11	Cowpea ( <i>Vigna catjang</i> ).	Bihar	10.86	6.80	17.38	33.10	36.16	2.50
<i>Grass—Anjan (Pennisetum cenchroides).</i>								
12	Ditto young	Bangalore	13.82	9.23	12.41	...	...	...
13	Ditto prime	„	11.57	6.61	9.97	...	...	...
14	Ditto ripe	„	10.26	4.93	7.25	...	...	...
15	Ditto young	Bihar	17.05	9.42	7.40	...	...	...
16	Ditto prime	„	13.45	7.06	8.18	...	...	...
17	Ditto ripe	„	13.71	6.00	5.54	...	...	...
18	Ditto maximum	Punjab	20.85	10.96	12.02	43.62	56.84	2.30
19	Ditto minimum	„	9.14	3.63	3.00	25.30	39.00	0.97
20	Ditto average	„	16.08	8.14	8.36	30.54	43.30	1.72
21	Ditto young	„	18.10	9.60	11.42	27.20	41.41	1.87
22	Ditto prime	„	13.31	6.45	6.24	34.43	44.55	1.47
23	Ditto ripe	„	15.85	8.73	9.10	29.16	44.29	1.60
24	Grass—Bur ripe stage	„	12.34	3.90	6.13	30.46	49.23	1.84
<i>(Andropogon laniger)</i>								
25	Grass—Chimbar ( <i>Elyusine flagellifera</i> )	„	12.55	6.87	11.42	33.88	40.57	1.58
26	Grass—Dedi ( <i>Gramineae ischaemum Rugosum</i> , Salisb.)	Bihar (Chalbas forest)	9.00	3.02	4.31	27.30	58.37	1.02
27	Grass—Dhub ( <i>Cynodon Dactylon</i> ).	Bangalore	11.74	6.82	12.72	31.00	42.42	2.12
28	Grass—Dhub young	„	13.54	7.84	14.75	...	...	...
29	Ditto prime	„	11.91	6.08	11.07	...	...	...
30	Ditto ripe	„	9.31	4.85	8.44	...	...	...
31	Ditto young	Bihar	15.07	9.94	7.61	...	...	...
32	Ditto prime	„	13.10	6.71	7.74	...	...	...
33	Ditto ripe	„	10.72	5.26	5.81	...	...	...
34	Ditto maximum	Punjab	13.97	7.38	21.94	39.74	55.40	2.71
35	Ditto minimum	„	7.79	2.27	4.90	18.63	41.97	1.21
36	Ditto average	„	11.75	5.60	10.47	28.17	47.81	1.80
37	Ditto young	„	12.58	6.20	21.94	18.63	44.14	2.71
38	Ditto prime	„	12.65	5.69	10.04	31.89	44.00	1.42
39	Ditto ripe	„	7.79	2.27	4.90	39.74	46.07	1.50
40	Grass—Dila or motha ( <i>Cyperus tria</i> ) ripe stage	„	8.61	3.63	6.04	32.77	51.69	0.89
41	Grass—Elephant ( <i>Pennisetum purpureum</i> ).	„	16.04	10.16	6.16	28.07	47.47	2.26
42	Grass—Forest ( <i>Amphiphiis glabrastaff</i> ).	Bihar (Ranchi)	8.48	2.51	5.66	22.80	60.86	2.20

DIX I

feeding stuffs on dry matter basis

No. of analyses	Mineral constituents						No. of analyses	Serial No.
	Ash sol. in HCl.	CaO	P <sub>2</sub> O <sub>5</sub>	MgO	Na <sub>2</sub> O	K <sub>2</sub> O		
1	10.90	1.06	0.42	0.63	0.46	6.24	1	1
1	8.61	0.84	0.48	0.48	0.06	4.80	1	2
1	6.28	0.73	0.50	0.41	0.19	3.38	1	3
1	5.40	0.60	0.39	0.34	0.24	2.96	1	4
1	5.09	0.55	0.44	0.33	0.13	2.96	1	5
...	9.19	0.72	0.59	0.29	0.94	3.98	...	6
2	12.09	2.33	0.75	0.77	...	4.78	1	7
...	14.43	4.05	0.92	0.72	2.58	5.09	...	8
...	7.07	2.20	0.32	0.38	0.96	1.44	...	9
14	12.00	2.69	0.64	0.61	1.67	3.40	13	10
1	6.80	1.96	0.78	1.44	...	1.85	1	11
2	9.23	0.41	0.65	0.35	1.33	4.14	2	12
2	6.61	0.49	0.47	0.39	1.20	2.49	2	13
2	4.93	0.43	0.39	0.40	0.89	1.67	2	14
4	9.42	0.75	0.64	0.38	1.14	4.32	4	15
4	7.06	0.72	0.50	0.38	0.95	3.13	4	16
3	6.00	0.63	0.69	0.33	1.10	1.68	3	17
...	10.96	1.90	1.05	0.51	1.91	4.53	...	18
...	3.63	0.43	0.41	0.19	0.10	1.26	...	19
22	8.14	0.77	0.72	0.36	1.14	3.33	22	20
4	9.60	0.70	0.85	0.36	1.48	4.11	4	21
7	6.45	0.67	0.61	0.35	0.83	3.04	7	22
5	8.73	0.60	0.65	0.36	1.18	2.73	5	23
1	3.90	1.04	0.34	0.38	0.07	1.65	1	24
6	6.87	0.95	0.59	0.37	0.92	1.40	6	25
1	3.02	0.32	0.32	0.22	...	0.80	1	26
1	...	...	...	...	...	...	...	27
2	7.84	0.81	0.58	0.39	0.47	3.17	2	28
2	6.08	0.70	0.51	0.32	0.43	2.33	2	29
2	4.85	0.41	0.28	0.34	0.83	2.00	2	30
2	9.94	1.07	0.41	0.44	0.52	5.16	2	31
2	6.71	0.90	0.44	0.36	0.79	2.76	2	32
2	5.26	0.72	0.45	0.31	0.86	1.95	2	33
...	7.38	0.98	0.52	0.30	0.57	3.85	...	34
...	2.27	0.50	0.23	0.19	0.06	0.84	...	35
15	5.60	0.77	0.59	0.34	0.23	2.08	15	36
1	8.20	0.81	0.82	0.44	0.15	2.36	1	37
5	5.69	0.81	0.63	0.42	0.28	0.25	5	38
1	2.27	0.50	0.23	0.19	0.13	0.84	1	39
1	3.63	1.15	0.27	0.35	0.41	0.95	1	40
4	10.16	0.70	0.61	0.30	0.68	2.99	4	41
1	2.51	0.31	0.29	0.22	...	0.56	1	42

Serial No.	Name	Place of origin	Total ash	Ash sol. in HCl.	Organic constituents			
					Crude protein	Carbohydrates		Ether extract
						Fibre	Nitrogen free extract	
43	Grass—Forest ( <i>Gramineae Hetropogon contortus</i> Roem.)	Bihar (Prohat Range).	7.98	2.78	3.94	31.30	55.65	1.13
44	Grass—Forest ( <i>Gramineae Imperata arundanacea</i> Cvrill).	" "	4.88	3.52	3.56	33.90	50.26	1.40
45	Grass—Ghumur ( <i>Panicum antidotale</i> ) ripe stage.	Punjab	7.97	3.84	7.26	40.47	43.11	1.19
46	Grass—Guinea ( <i>Panicum maximum</i> ) maximum	Bangalore	16.07	10.09	13.96	41.76	49.96	2.66
47	Ditto minimum.	" "	11.39	5.89	4.73	31.59	35.57	0.66
48	Ditto average .	" "	13.87	7.25	7.69	37.33	39.44	1.67
49	Ditto young .	" "	15.54	8.55	7.88	38.38	37.01	1.19
50	Ditto prime .	" "	12.32	6.31	4.82	42.14	40.06	0.66
51	Ditto .	Bengal	13.94	5.88	7.97	32.36	43.99	1.73
52	Ditto .	Punjab	12.15	...	5.22	36.33	44.70	1.55
53	Ditto .	Central Provinces	...	...	...	...	...	...
54	Grass ( <i>Iscilima Weightii</i> ) early.	Bombay	10.22	4.54	6.02	36.62	45.76	1.38
55	Ditto before flower .	" "	10.31	3.61	4.21	38.87	45.59	1.02
56	Ditto in flower .	" "	9.41	3.61	4.03	41.09	44.32	1.10
57	Ditto in seed .	" "	10.55	2.87	3.21	37.39	47.73	1.12
58	Grass—Lampa ( <i>Aristida depressa</i> ).	Punjab Simla Hills.	4.95	1.45	2.31	42.25	41.99	1.50
59	Grass—Makra or Madhana ( <i>Flusina aegyptiaca</i> ) milk stage.	Punjab	12.46	8.65	7.25	33.74	45.32	1.23
60	Grass—Mixture ( <i>Pennisetum cenchroides</i> and <i>Andropogon contortus</i> ).	" "	12.80	4.45	3.06	35.01	48.14	0.99
61	Grass—Mixture ( <i>Pennisetum cenchroides</i> and <i>Andropogon pertusus</i> ) milk stage.	" "	9.66	4.31	5.33	34.30	49.08	1.63
62	Grass—Mushyal ( <i>Iscilima lazum</i> ) before flower	Bombay	11.64	4.03	5.06	34.24	47.70	1.36
63	Ditto in flower .	" "	9.85	2.97	3.69	38.79	46.68	0.99
64	Ditto in seed .	" "	11.80	2.51	2.79	34.52	49.79	1.10
65	Ditto .	Central Provinces	...	...	...	...	...	...
66	Grass—Napier ( <i>Pennisetum purpureum</i> ).	Bengal	16.70	10.07	5.35	31.90	44.16	1.89
67	Grass—Palwan ( <i>Andropogon pertusus</i> ).	Punjab	10.42	5.87	8.78	33.00	46.13	1.67
68	Ditto flowering stage	" "	9.10	2.86	4.74	41.09	43.76	1.31
69	Ditto pre-milk stage	" "	10.01	3.31	3.14	35.20	50.54	1.11
70	Ditto milk stage .	" "	10.94	4.06	4.72	40.71	42.30	1.33
71	Ditto ripe stage .	" "	9.82	3.08	4.81	36.27	48.31	0.79
72	Grass—Panni ripe stage ( <i>Andropogon muricatus</i> )	" "	12.60	6.09	4.84	36.60	44.78	1.18
73	Grass—Sudan ( <i>Andropogon Sorghum</i> var. <i>Sudanensis</i> ).	" "	14.39	7.49	5.68	27.03	51.01	1.89
	Grass Miscellaneous—Full maturity.	Central Provinces Nagpur Farm.	...	...	...	...	...	...
74	<i>Andropogon annulatus</i>	Ditto	...	...	...	...	...	...
75	" <i>caricosus</i>	Ditto	...	...	...	...	...	...
76	" <i>contortus</i>	Ditto	...	...	...	...	...	...
77	" <i>monti kola</i>	Ditto	...	...	...	...	...	...
78	" <i>pertusus</i>	Ditto	...	...	...	...	...	...

DIX I—contd.

No. of analyses	Mineral constituents						No. of analyses	Serial No.
	Ash sol. in HCl.	CaO	P <sub>2</sub> O <sub>5</sub>	MgO	Na <sub>2</sub> O	K <sub>2</sub> O		
1	2.78	0.85	0.16	0.26	...	0.93	1	43
1	3.52	1.25	0.16	0.21	...	1.48	1	44
1	3.84	0.54	0.21	0.35	0.34	1.95	1	45
...	8.55	0.85	0.90	0.57	0.74	3.78	...	46
...	6.31	0.54	0.37	0.38	0.23	2.23	...	47
23	7.08	0.71	0.56	0.45	0.41	2.92	13	48
1	8.55	0.71	0.90	0.50	0.64	3.78	1	49
1	6.31	0.54	0.72	0.44	0.45	2.56	1	50
1	5.88	1.23	0.54	0.73	0.57	1.45	1	51
1	...	...	...	...	...	...	...	52
...	...	1.81	0.59	...	...	1.81	1	53
2	4.54	0.39	0.33	0.31	0.31	1.92	2	54
2	3.61	0.37	0.15	0.30	0.31	1.23	2	55
2	3.61	0.38	0.20	0.30	0.21	1.21	3	56
2	2.87	0.46	0.16	0.40	0.23	0.64	3	57
1	1.45	0.49	0.12	0.23	0.17	0.38	1	58
1	8.65	0.91	0.49	0.70	0.74	3.75	1	59
1	4.45	0.70	0.29	0.34	0.15	1.12	1	60
1	4.31	0.53	0.63	0.33	0.37	2.07	1	61
3	4.03	0.49	0.17	0.32	0.36	1.08	3	62
3	2.97	0.50	0.16	0.29	0.22	0.87	3	63
3	2.51	0.59	0.29	0.35	0.25	0.46	3	64
...	...	0.79	0.22	...	...	0.88	1	65
1	10.07	0.46	0.80	0.37	0.30	4.80	1	66
7	5.87	0.78	0.56	0.33	0.12	2.29	7	67
2	2.86	0.47	0.29	0.21	0.14	2.09	2	68
2	3.31	0.61	0.32	0.27	0.13	1.20	2	69
2	4.96	0.69	0.47	0.40	...	2.53	2	70
1	3.06	0.54	0.37	0.23	0.49	1.60	1	71
1	6.09	0.57	0.27	0.29	0.28	1.31	1	72
5	7.49	1.19	1.33	0.50	0.08	1.99	5	73
...	...	0.58	0.24	...	...	1.40	1	74
...	...	1.14	0.14	...	...	2.36	1	75
...	...	0.45	0.33	...	...	0.41	1	76
...	...	0.87	0.43	...	...	0.68	1	77
...	...	0.76	0.32	...	...	0.94	1	78



Serial No.	Name	Place of origin	Total ash	Ash sol. in HCl.	Organic constituents			
					Crude protein	Carbohydrates		Ether extract
						Fibre	Nitrogen free extract	
79	<i>Andropogon pumilus</i>	Central Provinces, Nagpur Farm.	...	...	...	...	...	...
80	" <i>purpureosariculus</i> .	Nagpur	...	...	...	...	...	...
81	<i>Apludavaria</i>	"	...	...	...	...	...	...
82	<i>Ischaemum laxum</i>	"	...	...	...	...	...	...
83	<i>Ischaemum sulcatum</i>	"	...	...	...	...	...	...
84	Grass from Adhartal Farm.	Central Provinces.	...	...	...	...	...	...
85	Do. from Betul Farm	"	...	...	...	...	...	...
86	Do. Bargaon Farm	"	...	...	...	...	...	...
87	Do. Buldana Farm	"	...	...	...	...	...	...
88	Do. Khandwa Farm	"	...	...	...	...	...	...
89	Do. Powar k h e d a Farm.	"	...	...	...	...	...	...
90	Do. Raipur Farm	"	...	...	...	...	...	...
91	Do. Seoni Farm	"	...	...	...	...	...	...
92	Do. Sindewahi Farm	"	...	...	...	...	...	...
93	Do. Tellankheri Farm	"	...	...	...	...	...	...
94	Do. Tharsa Farm	"	...	...	...	...	...	...
95	Do. Degnullah area	Punjab	9.12	4.97	7.21	32.29	50.01	1.37
96	Do. the adjoining Degnullah area.	"	9.76	7.25	3.35	34.83	51.15	0.91
97	Gram-green fodder ( <i>Cicer-arietinum</i> ).	"	9.07	7.48	10.88	33.06	44.91	2.09
98	Ditto whole plant	"	11.38	8.06	11.28	27.16	47.96	2.22
99	Guara ( <i>Cyamopsis Psoraloides</i> ).	"	12.72	10.74	8.56	29.99	47.00	1.73
100	Ditto	Central Provinces, Nagpur.	...	...	...	...	...	...
101	Juar ( <i>Andropogon Sorghum</i> ) young.	Bangalore	9.40	6.48	8.91	35.13	44.42	2.14
102	Ditto prime maximum	"	12.08	6.78	10.05	41.14	53.13	2.38
103	Ditto " minimum	"	5.91	3.53	3.42	27.23	43.10	1.06
104	Ditto " average	"	8.55	4.96	7.75	32.36	49.61	1.73
105	Ditto " ripe	"	8.06	4.85	4.63	38.66	47.49	1.16
106	Ditto age; 9-10½ weeks	Bihar	7.58	4.96	2.85	30.91	57.48	1.18
107	Ditto (18 weeks)	"	5.68	2.41	3.49	30.89	58.49	1.45
108	Ditto young	Punjab	8.08	4.78	5.21	38.87	45.59	1.37
109	Ditto prime	"	6.37	3.40	3.76	35.13	53.34	1.40
110	Ditto ripe	"	7.11	3.50	3.87	33.68	53.78	1.56
111	<i>Lobia (Dolichos lablab)</i>	"	14.80	...	...	28.08	...	3.50
112	Lucerne ( <i>Medicago sativa</i> ) maximum.	Bangalore	11.76	10.95	25.81	35.21	39.94	3.08
113	Ditto minimum	"	9.42	0.03	16.85	26.97	30.24	1.34
114	Ditto average	"	10.69	10.07	20.24	30.13	36.62	2.32
115	Ditto maximum	Punjab	17.66	15.44	26.60	43.66	46.23	2.68
116	Ditto minimum	"	9.27	8.19	13.31	21.02	21.16	1.03
117	Ditto average	"	14.10	11.73	19.90	29.51	34.68	1.81
118	Ditto	Bihar	14.49	12.32	22.71	21.54	38.39	2.87
119	Maize ( <i>Zea Mays</i> )	"	8.15	4.99	6.74	35.95	47.07	2.09
120	Ditto	Lyallpur	8.98	...	7.62	25.78	56.20	1.47
121	<i>Moth (Phaseolus acornifolius)</i> .	Punjab	15.53	12.42	12.12	30.70	39.95	1.70
122	<i>Methi (Trigonella foenum-graecum)</i> .	"	8.80	8.27	15.69	31.05	42.39	2.07
123	Oats ( <i>Avena sativa</i> )	"	13.91	10.81	14.63	32.88	36.44	2.14
124	" French milk stage	"	9.33	6.26	6.44	28.72	53.20	2.31
125	" ripe	"	9.36	7.30	9.24	34.82	44.78	1.80
126	Peas ( <i>Pisum Sativa</i> ) 11½ weeks.	"	3.89	3.05	16.69	22.60	54.42	2.40
127	<i>Senji (Melilotus parviflora)</i> .	"	9.50	6.10	15.46	31.62	41.95	1.47

DIX I—contd.

No. of analyses	Mineral constituents						No. of analyses	Serial No.
	Ash sol. in HCl.	CaO	P <sub>2</sub> O <sub>5</sub>	MgO	Na <sub>2</sub> O	K <sub>2</sub> O		
...	...	0.86	0.37	...	...	1.39	1	79
...	...	0.75	0.32	...	...	2.13	1	80
...	...	0.59	0.55	...	...	1.16	1	81
...	...	0.59	0.22	...	...	0.51	1	82
...	...	0.52	0.33	...	...	0.50	1	83
...	...	0.49	0.12	...	...	0.17	1	84
...	...	0.58	0.23	...	...	0.98	1	85
...	...	0.57	0.06	...	...	0.44	1	86
...	...	0.39	0.05	...	...	0.54	1	87
...	...	0.51	0.04	...	...	0.35	1	88
...	...	0.73	0.18	...	...	0.87	1	89
...	...	0.67	0.21	...	...	0.34	1	90
...	...	0.69	0.24	...	...	0.97	1	91
...	...	0.47	0.07	...	...	0.35	1	92
...	...	0.54	0.36	...	...	2.00	1	93
...	...	0.45	0.13	...	...	0.55	1	94
1	4.97	0.43	0.47	0.61	1.04	1.12	1	95
1	7.25	0.53	0.32	0.62	1.44	1.50	1	96
2	7.48	1.79	0.52	0.44	0.86	2.77	2	97
4	8.06	1.98	0.57	0.47	0.35	2.60	4	98
2	10.74	3.20	0.38	1.05	0.34	2.55	2	99
...	...	5.42	0.42	...	...	3.94	1	100
6	...	0.51	0.57	0.45	0.45	2.68	1	101
...	...	...	...	...	...	...	...	102
...	...	...	...	...	...	...	...	103
28	...	...	...	...	...	...	...	104
6	...	0.35	0.43	0.29	...	1.57	1	105
3	4.96	0.59	0.42	0.76	...	2.04	3	106
2	2.41	0.62	0.33	0.25	...	0.58	2	107
5	4.78	0.69	0.41	0.35	0.27	2.45	5	108
6	3.40	0.59	0.32	0.35	0.17	1.67	6	109
6	3.50	0.63	0.25	0.37	0.11	1.76	6	110
2	...	2.77	0.60	0.97	0.55	3.52	2	111
...	...	...	...	...	...	...	...	112
...	...	...	...	...	...	...	...	113
6	...	1.73	0.79	0.41	0.72	4.38	1	114
...	15.44	3.64	1.12	0.79	0.53	4.98	...	115
...	8.19	1.94	0.35	0.26	0.06	2.21	...	116
14	11.73	2.80	0.74	0.44	0.35	4.11	14	117
1	...	...	...	...	...	...	...	118
3	4.99	0.73	0.63	0.74	...	1.61	3	119
1	...	...	...	...	...	...	...	120
1	12.42	3.60	0.62	0.79	0.07	3.30	1	121
1	8.27	2.06	0.51	3.42	0.30	2.77	1	122
7	10.81	0.67	0.76	0.37	1.09	5.28	7	123
3	6.26	0.66	0.50	0.37	0.70	3.43	3	124
1	7.30	0.49	0.35	0.21	0.87	2.93	1	125
1	3.05	1.63	0.60	0.31	...	0.91	1	126
4	6.10	1.89	0.42	0.44	0.34	2.21	4	127

Serial No.	Name	Place of origin	Total ash	Ash sol. in HCl.	Organic constituents			
					Crude protein	Carbohydrates		Ether extract
						Fibre	Nitrogen free extract	
128	Shaftal ( <i>Trifolium repens</i> ).	Punjab .	17.66	18.95	21.51	16.90	42.02	1.91
129	Shisham leaves ( <i>Dalbergia Sissoo</i> ).	" .	13.48	...	2.71	26.71	54.68	2.42
130	Soya beans ( <i>Glycin hispida</i> ).	Bihar .	9.40	8.73	12.56	23.69	52.13	2.22
131	Sun flower ( <i>Helianthus annuus</i> ).	Punjab .	15.38	...	11.94	23.98	45.26	3.44
132	Teosinte ( <i>Euchlaena mexicana</i> ).	Bihar .	10.80	6.09	4.47	32.20	51.33	1.20
133	Velvet bean ( <i>Stizolobium decringeanum</i> ).	Punjab .	14.93	...	15.14	19.27	48.53	2.13
134	Water Hyacinth ( <i>Eichharnia speciosa</i> ).	Bengal .	16.47	16.06	6.54	24.70	50.59	1.70
135	Wheat ( <i>Triticum vulgare</i> ).	Punjab .	8.65	5.61	7.34	34.73	47.97	1.81
	<i>Silage.</i>							
136	Grass	" .	14.44	4.79	7.77	33.75	42.55	1.49
137	Guinea grass ( <i>Panicum maximum</i> )	Bangalore	9.90	4.69	5.23	38.73	44.61	1.53
	<i>Juar young</i>							
138	( <i>Andropogon Sorghum</i> ).	" .	14.58	8.04	7.17	39.24	37.22	1.79
139	Ditto prime maximum	" .	14.98	7.50	7.12	41.68	50.28	2.61
140	Ditto " minimum	" .	6.80	3.85	4.94	29.36	40.87	1.05
141	Ditto " average	" .	10.63	5.51	5.89	37.33	44.38	1.77
142	Ditto " ripe	" .	6.49	2.80	4.48	41.56	45.91	1.57
143	Malze ( <i>Zea Mays</i> )	Punjab .	11.33	...	7.92	24.57	55.08	1.10
144	Oat ( <i>Avena sativa</i> )	" .	9.54	...	7.73	40.29	40.15	2.29
145	Ragi straw ( <i>Eleusine coracana</i> ).	Bangalore	9.62	6.46	3.64	38.78	46.49	1.47
146	Rice straw ( <i>Oryza sativa</i> )	" .	11.40	6.17	5.92	30.01	47.47	1.66
147	Shisham leaves ( <i>Dalbergia Sissoo</i> )	Punjab .	14.41	...	3.18	27.58	51.60	3.28
148	Spear grass young ( <i>Andropogon contortus</i> ).	Hosur, Madras	12.22	5.30	6.62	36.85	43.05	1.26
149	Ditto prime	" .	15.53	5.39	6.59	32.60	43.63	1.65
150	Wheat straw ( <i>Triticum vulgare</i> ).	Punjab .	14.62	3.76	3.47	39.38	42.06	0.47
	<b>DRIED ROUGHAGES</b>							
	<i>Hays</i>							
151	Ajjampur hay young	Mysore .	12.47	6.36	7.77	36.85	41.90	1.06
152	Ditto prime	" .	11.60	5.63	5.44	39.22	42.80	0.95
153	Ditto ripe	" .	8.48	4.21	3.21	37.18	50.40	0.74
154	Ahmadnagar hay	Ahmadnagar.	16.31	2.30	3.85	36.91	41.95	0.98
155	Ambala hay	Punjab .	10.72	6.26	5.55	35.84	46.47	1.42
156	<i>Andropogon annulatus</i> early.	Bombay	13.58	5.55	9.70	33.03	42.51	1.18
157	Ditto just before flower	" .	10.81	3.40	5.20	38.50	44.47	1.02
158	Ditto in flower	" .	10.64	3.20	4.08	39.89	44.36	1.08
159	Ditto in seed	" .	11.46	2.33	2.68	39.07	45.63	1.16
160	Ditto early	P u s a (Bihar).	...	...	...	...	...	...
161	Ditto in flower	" .	...	...	...	...	...	...
162	Ditto ripe	" .	...	...	...	...	...	...
163	Anjan hay ( <i>Pennisetum cenchroides</i> ) early.	Bihar	...	...	...	...	...	...
164	Ditto just before flower	" .	...	...	...	...	...	...
165	Ditto in flower	" .	...	...	...	...	...	...
166	Ditto dead ripe	" .	...	...	...	...	...	...
167	Ditto early	Bombay.	...	...	...	...	...	...
168	Ditto in flower	" .	...	...	...	...	...	...
169	Ditto in flower	Bangalore	...	...	...	...	...	...
170	Ditto dead ripe	" .	...	...	...	...	...	...
171	Ditto	Meerut .	10.18	4.60	4.87	32.91	51.21	0.83

DIX I—*contd.*

No. of analyses	Mineral constituents						No. of analyses	Serial No.
	Ash sol. in HCl	CaO	P <sub>2</sub> O <sub>5</sub>	MgO	Na <sub>2</sub> O	K <sub>2</sub> O		
4	13.95	2.79	0.76	0.56	0.67	4.87	4	128
3	...	...	...	...	...	...	...	129
1	8.73	1.87	0.57	1.39	...	2.35	1	130
1	...	...	...	...	...	...	...	131
1	6.09	1.07	0.37	0.49	...	2.24	1	132
1	...	...	...	...	...	...	...	133
1	...	...	...	...	...	...	...	134
2	5.61	0.41	0.36	0.31	0.11	3.29	2	135
2	...	...	...	...	...	...	...	136
2	...	...	...	...	...	...	...	137
3	...	...	...	...	...	...	...	138
...	...	...	...	...	...	...	...	139
...	...	...	...	...	...	...	...	140
21	...	0.64	0.42	0.42	...	2.48	1	141
1	...	...	...	...	...	...	...	142
1	...	...	...	...	...	...	...	143
2	...	...	...	...	...	...	...	144
1	...	...	...	...	...	...	...	145
3	...	...	...	...	...	...	...	146
2	...	...	...	...	...	...	...	147
1	...	...	...	...	...	...	...	148
4	...	...	...	...	...	...	...	149
2	...	...	...	...	...	...	...	150
1	6.36	0.84	0.44	0.41	0.07	2.90	1	151
1	5.63	0.56	0.44	0.39	0.18	2.18	1	152
1	4.21	0.51	0.15	0.49	0.13	0.82	1	153
1	...	...	...	...	...	...	...	154
1	6.26	0.57	0.67	0.24	0.87	2.53	1	155
4	5.55	0.64	0.56	0.35	0.44	2.15	4	156
7	...	0.66	0.33	0.34	0.43	1.26	4	157
8	...	0.58	0.24	0.29	0.27	1.08	4	158
8	...	0.58	0.11	0.30	0.35	0.50	4	159
...	...	1.00	0.52	0.26	0.62	2.50	2	160
...	...	0.63	0.44	0.21	0.15	0.81	1	161
...	...	1.15	0.46	0.21	0.13	0.44	1	162
...	...	0.75	0.64	0.38	1.14	4.07	4	163
...	...	0.70	0.57	0.38	1.27	4.13	3	164
...	...	0.63	0.42	0.38	1.17	3.99	1	165
...	...	0.63	0.69	0.33	1.10	2.02	3	166
...	...	0.50	0.23	0.61	1.13	0.66	1	167
...	...	0.60	0.21	0.72	1.02	0.61	1	168
...	...	0.45	0.56	0.37	1.27	3.30	4	169
...	...	0.42	0.39	0.39	0.89	1.67	2	170
2	4.26	0.36	0.72	0.31	1.36	1.61	1	171

Serial No.	Name	Place of origin	Total ash	Ash sol. in HCl.	Organic constituents			
					Crude protein	Carbohydrates		Ether extract
						Fibre	Nitrogen free extract	
172	Anjan hay ( <i>Pennisetum Cenchroides</i> ).	Punjab	11.91	7.57	5.73	36.69	44.25	1.42
173	Aurangabad hay . . .	Aurangabad.	16.13	2.61	2.45	36.26	43.60	1.56
174	Ditto young . . .	"	14.48	2.23	4.16	40.65	39.56	1.15
175	Ditto prime . . .	"	15.40	2.47	2.53	37.78	42.81	1.43
176	Ditto ripe . . .	"	15.53	1.96	1.66	38.73	42.72	1.31
177	Babbar hay . . .	Murree Hills.	6.40	2.04	2.33	32.10	56.86	2.31
178	Bangalore hay . . .	Military Grass Farm.	10.02	2.45	2.47	35.41	50.84	1.26
179	Belgaum hay . . .	Belgaum	14.77	1.91	2.26	31.25	50.33	1.39
180	Bellary hay . . .	Bellary Madras.	14.04	2.66	2.44	36.90	45.36	1.23
181	Bir hay . . .	Hissar Farm.	11.24	6.47	5.51	29.67	52.56	1.02
182	Boda hay . . .	Cuddapah, Madras.	6.09	2.45	3.74	40.55	47.38	1.34
183	Bolarum hay . . .	Bolarum, Deccan.	13.30	2.96	2.81	37.00	45.45	1.44
184	Ditto young . . .	"	12.98	4.34	5.06	36.04	44.76	1.16
185	Ditto prime . . .	"	12.49	3.49	3.81	36.91	45.64	1.15
186	Ditto ripe . . .	"	9.44	1.75	1.98	33.28	49.44	0.86
187	Dalhousie hay . . .	Dalhousie	9.33	2.51	3.41	33.63	47.75	0.83
188	Dhub hay . . .	Bangalore	14.97	6.04	11.06	25.86	46.19	1.92
189	Ditto . . .	Bareilly	11.08	4.85	9.08	24.40	54.48	0.96
190	Ditto . . .	Fyzabad	12.10	5.98	7.68	23.23	53.66	3.33
191	Ditto . . .	Lucknow	10.07	4.56	7.51	20.77	61.14	0.51
192	Ditto . . .	Karnal	12.48	4.62	6.76	24.15	55.99	0.62
193	Ditto . . .	Lyallpur	12.54	...	11.10	18.38	56.60	1.38
194	Ferozepur hay . . .	Ferozepur	11.56	7.27	8.96	32.93	45.51	1.04
195	Guinea grass hay before flowering.	Bangalore	16.00	9.83	7.56	38.14	37.08	1.22
196	Ditto in flower . . .	"	12.30	6.10	4.76	42.10	39.69	1.15
197	Jarewah hay . . .	Lucknow	11.56	3.65	3.60	35.21	47.57	2.16
198	Jhelum hay . . .	Jhelum	9.63	5.25	5.15	29.93	54.08	1.21
199	Juar hay young ( <i>Andropogon Sorghum</i> ).	Bangalore	9.77	6.68	6.88	40.70	41.30	1.35
200	Ditto prime . . .	"	8.51	4.57	4.30	38.93	47.10	1.16
201	Ditto ripe . . .	"	7.62	4.57	4.41	42.07	44.82	1.08
202	Juar hay . . .	Punjab	10.23	4.75	5.42	37.76	44.06	1.63
203	Jubbulpore hay young . . .	Jubbulpore.	10.77	4.26	4.15	38.72	44.92	1.44
204	Ditto prime . . .	"	8.63	3.07	3.24	39.28	47.73	1.12
205	Ditto ripe . . .	"	11.96	2.45	2.53	39.55	44.88	1.03
206	Jullundur hay . . .	Jullundur	8.15	3.64	3.51	40.11	47.24	0.99
207	Jutogh . . .	Jutogh	7.33	3.11	3.74	39.37	48.16	1.40
208	Kasauli hay . . .	Kasauli	8.76	3.84	4.19	36.90	48.41	1.74
209	Kollukattas grass hay young.	Hosur, Madras.	12.70	8.88	16.89	28.49	40.78	1.14
210	Ditto prime . . .	"	10.90	7.01	10.01	35.33	42.60	1.16
211	Ditto ripe . . .	"	9.93	5.28	6.38	33.30	49.71	0.68
212	Lahore hay . . .	Lahore	9.76	4.61	4.38	33.76	45.70	1.40
213	Lunter hay ( <i>Anthistiria anathera</i> ).	Murree Hills.	7.20	1.76	1.66	39.79	49.64	1.81
214	Meerut Farm hay . . .	Meerut	10.98	2.87	2.92	38.63	46.56	0.91
215	Ditto young . . .	"	14.64	4.09	3.54	32.61	47.60	1.61
216	Ditto prime . . .	"	14.03	3.65	2.92	31.97	49.62	1.56
217	Ditto ripe . . .	"	12.71	3.15	2.87	37.20	46.17	1.05
218	Multan hay (Geneva) . . .	Multan	10.68	4.44	2.98	39.20	45.81	1.23
219	Ditto (Musel) . . .	"	11.22	4.46	3.15	36.37	48.29	0.97
220	Murree hay . . .	Murree	7.35	2.74	3.68	43.89	43.17	1.91
221	Natal grass hay ( <i>Tricholaena rosea</i> ).	Mysore	7.99	4.47	5.61	41.61	43.39	1.40

DIX I—contd.

No. of analyses	Mineral constituents						No. of analyses	Serial No.
	Ash sol. in HCl.	CaO	P <sub>2</sub> O <sub>5</sub>	MgO	Na <sub>2</sub> O	K <sub>2</sub> O		
1	...	0.43	0.42	0.28	0.10	2.09	1	172
3	2.47	0.73	0.11	0.31	0.20	0.69	2	173
1	2.23	0.57	0.19	0.34	0.23	0.67	1	174
1	2.47	0.51	0.13	0.28	0.29	0.59	1	175
1	1.96	0.55	0.05	0.26	0.39	0.23	1	176
1	2.04	0.65	0.05	0.24	0.31	0.26	1	177
8	...	...	...	...	...	...	...	178
2	1.91	0.55	0.05	0.36	0.18	0.30	2	179
5	2.66	0.79	0.07	0.42	0.31	0.57	5	180
2	6.47	0.48	0.42	0.36	0.79	2.50	2	181
1	2.45	0.40	0.14	0.29	0.21	0.82	1	182
19	...	0.72	0.08	0.44	0.28	0.58	12	183
1	4.34	0.73	0.24	0.37	0.44	1.43	1	184
1	3.49	0.75	0.22	0.32	0.35	0.90	1	185
1	1.75	0.50	0.09	0.27	0.34	0.17	1	186
1	2.51	0.76	0.15	0.19	0.15	0.44	1	187
4	...	...	...	...	...	...	...	188
1	4.85	0.70	0.44	0.31	0.40	1.53	1	189
1	5.98	0.72	0.52	0.46	0.28	1.51	1	190
1	4.56	0.55	0.59	0.24	0.44	2.52	1	191
1	4.62	0.49	0.60	0.23	0.69	2.03	1	192
1	...	...	...	...	...	...	...	193
1	7.27	0.71	0.56	0.32	0.82	2.28	1	194
1	...	...	...	...	...	...	...	195
1	...	...	...	...	...	...	...	196
1	3.65	0.41	0.36	0.20	0.28	1.48	1	197
1	5.25	0.67	0.35	0.38	0.46	1.63	1	198
6	...	0.38	0.54	0.45	0.28	8.39	1	199
15	...	0.38	0.33	0.33	0.26	1.67	13	200
6	...	0.32	0.56	0.31	0.32	1.90	2	201
8	4.75	0.68	0.62	0.45	0.17	2.49	8	202
1	4.26	0.68	0.32	0.34	0.23	1.55	1	203
1	3.07	0.48	0.15	0.33	0.36	1.12	1	204
1	2.45	0.50	0.28	0.26	0.03	0.90	1	205
1	3.64	0.57	0.41	0.22	0.30	1.55	1	206
1	3.11	0.80	0.42	0.35	0.22	1.30	1	207
1	3.11	1.01	0.21	0.29	0.26	0.69	1	208
1	3.84	...	...	...	...	...	...	209
1	...	...	...	...	...	...	...	210
1	...	...	...	...	...	...	...	211
1	4.81	0.67	0.35	0.20	0.48	1.81	1	212
1	1.76	0.60	0.03	0.10	0.10	0.37	1	213
4	2.71	0.59	0.33	0.28	0.41	0.82	2	214
2	4.26	0.33	0.53	0.22	0.18	2.00	1	215
2	3.92	0.39	0.42	0.26	0.27	1.74	1	216
3	...	...	...	...	...	...	...	217
1	4.44	0.60	0.20	0.17	0.27	1.07	1	218
1	4.46	0.83	0.22	0.18	0.18	1.09	1	219
1	2.74	0.91	0.11	0.26	0.49	0.81	1	220
1	4.47	0.48	0.25	0.49	0.25	1.96	1	221

Serial No.	Name	Place of origin	Total ash	Ash sol. in HCl.	Organic constituents				
					Crude protein	Carbohydrates		Ether extract	
						Fibre	Nitrogen free extract		
222	Oat hay ( <i>Avena sativa</i> ).	Lahore .	8.40	4.91	5.23	28.90	56.44	1.08	
223	Ditto	Punjab .	8.34	5.10	5.60	35.92	48.45	1.69	
224	Rawalpindi hay .	Rawalpindi.	8.21	2.62	4.08	38.37	47.73	1.61	
225	Rhodes grass hay ( <i>Chloris gayana</i> ).	Bangalore	12.14	7.92	12.33	27.28	45.84	2.41	
226	Ditto young .	Hosur, Madras.	10.40	4.48	7.51	36.57	44.31	1.21	
227	Ditto prime .	"	11.08	5.43	9.36	36.16	42.14	1.26	
228	Ditto ripe .	"	9.08	3.88	6.36	39.31	44.09	1.16	
229	Rooosa hay .	Murree Hills.	8.35	2.44	2.63	33.54	53.18	2.80	
230	Rukh hay .	Bolarum	8.04	2.20	2.34	41.18	47.18	1.26	
231	Ditto ripe .	"	13.10	2.80	2.74	31.40	51.80	0.96	
232	Rukh hay .	Jubbulpore.	9.94	1.78	2.33	28.87	57.95	0.91	
233	Ditto .	Kirkee Poona.	17.17	2.12	2.53	34.12	45.30	0.88	
234	Scented grass hay .	Cuddappah, Madras.	7.21	3.92	6.49	35.77	47.26	3.27	
235	Seguri hay .	Seguri .	9.92	1.90	5.84	38.44	44.80	1.00	
236	Slalkot hay .	Slalkot	10.09	3.57	4.83	38.65	45.46	0.97	
237	Spear grass hay ( <i>Andropogon contortus</i> ) early.	Bangalore	...	...	...	...	...	...	
238	Ditto just before flower	"	...	...	...	...	...	...	
239	Ditto in flower .	"	8.76	3.46	5.61	38.21	46.00	1.42	
240	Ditto in seed .	"	9.74	2.07	3.18	37.39	48.22	1.47	
241	Ditto young .	Hosur, Madras.	9.22	4.27	6.97	34.52	47.94	1.35	
242	Ditto prime .	"	9.73	3.50	5.30	36.89	46.89	1.10	
243	Ditto ripe .	"	9.03	3.30	2.97	38.32	48.75	0.96	
244	Ditto early .	Bombay	13.31	3.36	5.88	33.58	46.11	1.12	
245	Ditto before flower	"	11.06	3.17	4.42	38.64	44.87	1.01	
246	Ditto in flower .	"	8.85	2.78	3.71	40.27	46.23	0.94	
247	Ditto in seed .	"	10.86	2.19	1.72	38.23	48.29	0.90	
248	Ditto early .	Bihar .	...	...	...	...	...	...	
249	Ditto in flower .	"	...	...	...	...	...	...	
250	Ditto ripe .	"	...	...	...	...	...	...	
251	Spear grass hay .	United Provinces.	10.11	1.82	2.28	33.74	53.07	0.80	
252	Ditto .	Murree Hills.	6.58	3.38	5.35	36.84	49.63	1.00	
253	Sugar Cane leaves .	Bangalore	6.09	3.18	2.64	37.18	52.73	1.36	
254	Swank hay .	Sargodha	7.97	3.84	7.26	40.47	43.11	1.19	
255	Tatkira hay .	Murree Hills.	6.69	2.35	2.47	31.64	57.19	2.01	
256	Telegaon hay .	Telegaon	15.72	2.34	2.72	37.47	43.12	0.97	
257	Tornagalli hay .	Tornagallu.	11.60	2.47	2.22	37.52	47.45	1.21	
258	Wheat hay .	Punjab .	7.23	3.51	5.06	35.12	51.32	1.27	
	<i>Legume hays</i>								
259	Berseem hay .	Punjab .	12.13	10.89	14.70	30.56	40.09	1.62	
260	Cluster bean hay .	Mysore .	16.51	13.47	25.21	13.82	43.59	0.87	
261	Cowpea hay .	"	13.32	10.19	15.31	34.84	35.44	1.09	
262	Gram hay .	Punjab .	11.17	8.26	12.91	36.33	38.14	1.46	
263	Groundnut hay .	Mysore .	14.81	11.73	21.51	24.54	38.19	0.95	
264	Kalai ( <i>Dolichos biflorus</i> ).	Sabour .	13.09	7.99	10.56	16.20	58.34	1.81	
265	Lobia hay ( <i>Dolichos lablab</i> ).	Sargodha	12.51	...	...	36.12	...	2.25	
266	Lucerne hay .	Bangalore	12.74	7.64	21.26	29.41	35.18	1.41	
267	Moth hay ( <i>Phaseolus acutifolius</i> )	Punjab .	13.75	10.07	10.59	26.75	47.06	1.85	
268	Pea hay ( <i>Pisum sativum</i> )	Sargodha	7.66	6.13	10.94	29.17	50.32	1.91	
269	Soya bean hay .	Mysore .	12.04	10.02	14.96	29.13	42.59	1.29	

DIX I—contd.

No. of analyses	Mineral constituents						No. of analyses	Serial No.
	Ash sol. in HCl.	CaO	P <sub>2</sub> O <sub>5</sub>	MgO	Na <sub>2</sub> O	K <sub>2</sub> O		
1	...	...	...	...	...	...	...	222
14	5.19	0.46	0.38	0.22	0.70	2.44	14	223
2	2.63	0.82	0.13	0.19	0.34	0.77	2	224
2	...	...	...	...	...	...	...	225
1	4.48	0.59	0.45	0.31	1.08	3.08	1	226
1	5.43	0.42	0.23	0.17	0.97	1.30	1	227
1	...	...	...	...	...	...	...	228
1	2.44	0.79	0.07	0.28	0.27	0.32	1	229
9	1.98	0.42	0.17	0.31	0.45	0.60	2	230
1	...	...	...	...	...	...	...	231
2	1.78	0.51	0.14	0.27	0.24	0.42	2	232
2	2.12	0.50	0.06	0.31	0.45	0.38	2	233
1	3.92	0.52	0.19	0.35	0.39	1.70	1	234
1	...	...	...	...	...	...	...	235
1	3.57	0.54	0.43	0.19	0.33	1.84	1	236
...	...	0.55	0.42	0.34	0.23	2.33	3	237
...	...	0.56	0.43	0.42	0.27	3.21	1	238
1	...	0.43	0.21	0.26	0.24	1.22	3	239
1	...	0.39	0.18	0.26	0.22	1.04	2	240
1	...	...	...	...	...	...	...	241
5	...	...	...	...	...	...	...	242
6	...	...	...	...	...	...	...	243
4	...	0.47	0.30	0.39	0.25	1.41	5	244
6	...	0.47	0.29	0.30	0.39	1.23	6	245
6	...	0.42	0.23	0.25	0.30	0.96	7	246
6	...	0.48	0.17	0.21	0.33	0.60	8	247
5	...	0.59	0.36	0.27	0.24	1.74	3	248
...	...	0.47	0.25	0.24	0.31	1.21	3	249
...	...	0.84	0.23	0.25	0.38	0.74	1	250
3	1.82	0.41	0.19	0.20	0.41	0.38	3	251
1	3.38	0.63	0.20	0.28	0.15	1.10	1	252
1	3.18	0.55	0.14	0.37	0.46	1.00	1	253
1	3.84	0.34	0.21	0.35	0.34	1.95	1	254
1	2.35	0.89	0.07	0.17	0.11	0.33	1	255
1	...	...	...	...	...	...	...	256
3	2.47	0.63	0.06	0.37	0.45	0.53	3	257
1	3.51	0.30	0.50	0.39	0.05	1.79	1	258
1	10.89	2.07	0.65	0.61	0.58	3.89	1	259
1	13.47	3.39	0.61	1.51	0.20	3.29	1	260
2	10.19	2.27	0.40	0.70	0.25	2.89	2	261
2	8.26	2.14	0.46	0.48	0.33	2.99	2	262
2	...	2.65	0.58	1.25	0.18	3.26	1	263
1	7.99	2.54	0.42	1.00	...	1.20	1	264
1	...	3.78	0.36	1.03	0.75	2.14	1	265
1	...	...	...	...	...	...	...	266
1	10.07	3.27	0.42	0.96	0.88	2.16	1	267
1	6.13	1.58	0.48	0.33	0.19	2.02	1	268
1	10.02	2.86	0.60	1.20	0.30	2.02	1	269



Serial No.	Name	Place of origin	Total ash	Ash sol. in HCl.	Organic constituents			
					Crude protein	Carbohydrates		Ether extract
						Fibre	Nitrogen free extract	
<b>DRIED ROUGHAGES</b>								
<i>Straws</i>								
270	<i>Aphida aristata</i> Linn	Palamau Forest, Bihar.	8.13	6.83	6.90	28.27	...	...
271	Barley stalks	Sargodha, Punjab.	6.08	4.74	2.97	38.59	51.32	1.04
272	Barley straw	M o n a, Punjab.	8.05	5.40	2.21	47.39	41.43	0.92
273	<i>Batasari</i>	Gollkera Forest, Bihar.	9.19	7.47	6.48	39.86	...	...
274	<i>Chrysopogon nonticola</i> Trin.	Palamau Forest, Bihar.	9.60	...	4.48	26.48	57.58	1.86
275	Gramineae <i>Alpuda varia Amutica</i> , L. Inc. <i>Aaristata</i> Willd.	P r o h a t R a n g e Forest, Bihar	10.23	8.77	5.88	26.42	...	...
276	Gram stalks	Punjab.	6.17	3.96	4.51	53.81	34.84	0.67
277	Gram straw	"	13.31	...	6.01	44.45	35.70	0.53
278	Jankai ( <i>Phragmites karka</i> ).	Gollkera Forest, Bihar.	15.81	13.65	3.77	29.79	...	...
279	Juar straw	Bangalore	9.82	5.45	4.91	34.17	49.55	1.44
280	<i>Khorpo bumbee Chrysopogon lancearins</i> .	Gollkera Forest, Bihar.	16.31	14.50	4.71	27.64	...	...
281	<i>Lupeed dumbu (Eulalia cumingii)</i> .	"	8.49	7.44	6.90	38.67	...	...
282	Millet straw	Bangalore	17.51	5.95	5.39	32.32	43.51	1.27
283	<i>Oplismenus burmannii</i> Beauv.	Palamau Forest, Bihar.	14.91	13.56	1.31	20.70	...	...
284	Ragi straw ( <i>Eleusine coracana</i> ).	Bangalore	8.10	5.35	3.67	35.93	51.38	0.92
285	Rice straw ( <i>Oryza sativa</i> )	"	17.28	4.41	2.92	33.36	45.58	0.86
286	Ditto (Aman)	Bengal	14.18	3.87	3.25	33.63	47.91	1.03
287	Ditto (Aus)	"	12.84	4.08	5.04	34.92	45.63	1.57
288	Ditto (Boro)	"	21.94	3.81	5.69	29.07	41.71	0.94
289	Ditto	K a n k e F a r m, Bihar.	15.20	2.50	3.75	30.70	49.40	0.95
290	Ditto	P u s a, Bihar.	17.28	4.41	2.92	33.36	45.58	0.86
291	Ditto	Kangrah Punjab.	16.49	7.46	2.40	36.49	43.75	0.87
292	Ditto	K a r n a l, Punjab.	20.39	6.05	3.75	30.61	43.67	1.55
293	<i>Rolega (Schima nervosum)</i> .	Gollkera Forest, Bihar.	8.88	7.22	4.46	24.53	...	...
294	<i>Rottboelia exaltata</i>	Palamau Forest, Bihar.	10.80	...	5.25	31.13	52.02	0.80
295	<i>Schizachyrium brevifolium</i> Nees.	"	12.10	10.70	4.66	26.11	...	...
296	Tonto Jono	Gollkera Forest, Bihar.	9.21	7.66	5.45	25.04	...	...
297	Wheat <i>bhoosa</i>	K a r n a l, Punjab.	14.07	3.13	2.39	39.55	42.97	1.02
298	Wheat straw	P u s a, Bihar.	11.30	6.39	3.28	42.14	41.66	1.62
299	Ditto	Karnal, Punjab.	11.83	3.91	3.26	38.51	45.24	1.16



Serial No.	Name	Place of origin	Total ash	Ash sol. in HCl.	Organic constituents			
					Crude protein	Carbohydrates		Ether extract
						Fibre	Nitrogen free extract	
<b>CONCENTRATES</b>								
<i>Grains and seeds</i>								
300	<i>Babul pods (Acacia beans).</i>	P u s a , Bihar.	5.47	5.30	15.77	12.44	65.52	0.80
301	Ditto ripe . . . . .	" . . . . .	6.24	6.09	14.91	16.50	59.56	2.79
302	<i>Babul seed (crushed)</i> . . . . .	Karnal . . . . .	7.43	5.73	14.64	14.80	59.87	3.26
303	Barley . . . . .	Bangalore . . . . .	4.53	2.68	9.48	5.23	79.09	1.67
304	Ditto . . . . .	M o n a , Punjab . . . . .	3.21	2.38	11.50	5.39	78.84	1.06
305	Barley heads . . . . .	Punjab . . . . .	4.79	2.56	9.89	20.21	64.00	1.11
306	Cotton seed . . . . .	" . . . . .	4.66	...	18.02	25.74	30.98	20.60
307	Gram . . . . .	Bangalore . . . . .	3.48	3.10	21.63	9.72	62.09	3.08
308	" . . . . .	Pusa . . . . .	3.59	3.43	20.19	9.81	62.19	4.22
309	" (grain) . . . . .	Punjab . . . . .	3.50	3.42	18.06	9.83	63.67	4.94
310	" (grain with pods) . . . . .	" . . . . .	9.08	8.38	16.18	23.79	48.18	2.77
311	Groundnut (kernel) . . . . .	" . . . . .	2.15	2.10	31.28	1.39	13.61	51.57
312	Horse gram . . . . .	" . . . . .	5.10	3.95	24.74	4.82	64.38	0.96
313	Matze . . . . .	" . . . . .	1.94	...	11.11	1.90	80.66	4.39
314	Oats . . . . .	" . . . . .	4.79	1.83	10.07	12.71	65.83	6.55
315	Rice . . . . .	Bangalore . . . . .	1.28	0.96	8.33	0.38	89.13	0.88
316	<i>Sengi pods</i> . . . . .	Punjab . . . . .	8.54	8.09	25.30	14.85	49.37	1.94
317	Wheat . . . . .	Karnal . . . . .	1.97	1.89	9.65	2.41	84.70	1.27
<i>Oil cakes and meals</i>								
318	Cocoonut cakes (country mill pressed).	Cochin . . . . .	8.37	6.14	23.44	12.91	42.28	13.00
319	Ditto (expeller) . . . . .	" . . . . .	8.34	6.48	25.34	13.20	44.92	8.20
320	Cotton seed cake . . . . .	Punjab . . . . .	6.50	...	22.84	24.11	37.40	9.15
321	Cotton seed meal . . . . .	Bangalore . . . . .	7.96	6.94	37.22	7.63	34.31	12.88
322	Groundnut cake . . . . .	" . . . . .	5.70	4.76	51.75	7.39	26.94	8.22
323	Linseed cake . . . . .	Bengal . . . . .	10.20	6.96	30.51	9.48	43.24	6.57
324	Linseed meal . . . . .	Karnal . . . . .	6.78	5.57	29.90	9.77	49.43	4.12
325	<i>Mohua cake</i> . . . . .	" . . . . .	9.03	5.11	17.90	5.62	50.22	17.23
326	Rape cake . . . . .	Pusa . . . . .	9.33	7.43	36.37	7.70	33.19	13.41
327	Safflower cake . . . . .	Bombay . . . . .	6.80	5.19	42.80	15.25	26.62	8.53
328	<i>Sarson cake</i> . . . . .	Punjab . . . . .	9.99	...	36.09	10.05	32.76	11.11
329	<i>Til cake</i> . . . . .	Bangalore . . . . .	11.02	6.85	46.30	4.92	27.85	9.91
330	<i>Toria cake</i> . . . . .	Lyallpur . . . . .	7.54	...	33.79	11.20	34.08	12.49
<i>By-products</i>								
331	<i>Arhar husk</i> . . . . .	Pusa . . . . .	5.67	4.76	7.04	44.10	42.79	0.40
332	Brewery grain . . . . .	Bangalore . . . . .	4.15	2.19	19.18	13.53	59.32	3.32
333	Gram dust . . . . .	Pusa . . . . .	5.55	4.61	17.48	27.01	47.45	2.51
334	Gram husk . . . . .	Bangalore . . . . .	5.99	4.05	5.75	48.40	38.95	0.91
335	Groundnut shell . . . . .	" . . . . .	14.25	10.20	8.16	59.74	14.83	3.02
336	Molasses (khandsari) . . . . .	" . . . . .	6.08	...	0.92	...	93.08	...
337	Rice bran . . . . .	H o s u r , Madras . . . . .	22.08	6.92	10.40	14.69	39.85	12.98
338	Ditto . . . . .	Bengal . . . . .	15.85	11.29	13.99	14.13	35.65	20.39
339	Wheat bran . . . . .	Bangalore . . . . .	5.59	4.64	15.41	10.76	64.70	3.45
340	Ditto . . . . .	Pusa . . . . .	9.90	7.32	11.30	16.62	60.36	1.73

DIX I—concl.

No. of analyses	Mineral constituents						No. of analyses	Serial No.
	Ash sol. in HCl.	CaO	P <sub>2</sub> O <sub>5</sub>	MgO	Na <sub>2</sub> O	K <sub>2</sub> O		
2	...	...	...	...	...	...	...	300
1	...	...	...	...	...	...	...	301
1	...	...	...	...	...	...	...	302
1	...	...	...	...	...	...	...	303
1	2.38	0.25	0.85	0.21	0.05	0.56	1	304
3	2.56	0.40	0.42	0.26	0.14	1.07	3	305
6	...	...	...	...	...	...	...	306
2	...	...	...	...	...	...	...	307
1	...	...	...	...	...	...	...	308
1	3.42	0.33	0.93	0.27	0.22	0.72	1	309
5	8.38	1.94	0.56	0.50	0.16	2.15	5	310
4	...	...	...	...	...	...	...	311
4	...	...	...	...	...	...	...	312
1	...	(0.02)*	(0.94)*	...	...	...	...	313
5	...	(0.16)*	(0.93)*	...	...	...	...	314
4	...	0.22	0.48	0.18	...	0.32	1	315
1	3.09	1.87	0.80	0.41	...	2.78	1	316
1	1.89	0.32	0.94	0.17	0.68	0.47	1	317
1	...	...	...	...	...	...	...	318
1	...	(0.56)*	(1.69)*	...	...	...	...	319
1	...	...	...	...	...	...	...	320
8	...	(0.39)*	(2.96)*	...	...	...	...	321
81	...	0.28	1.28	0.54	0.32	1.43	46	322
2	6.96	0.52	2.20	0.98	0.47	0.92	2	323
4	...	...	...	...	...	...	...	324
2	...	...	...	...	...	...	...	325
16	...	...	...	...	...	...	...	326
11	...	...	...	...	...	...	...	327
1	...	...	...	...	...	...	...	328
3	...	...	...	...	...	...	...	329
1	...	...	...	...	...	...	...	330
1	...	...	...	...	...	...	...	331
11	...	...	...	...	...	...	...	332
1	...	...	...	...	...	...	...	333
8	...	...	...	...	...	...	...	334
...	...	...	...	...	...	...	...	335
...	...	...	...	...	...	...	...	336
6	...	...	...	...	...	...	...	337
2	11.29	0.22	6.23	0.26	0.38	0.19	2	338
26	...	0.25	1.98	0.75	0.35	1.46	6	339
1	...	...	...	...	...	...	...	340

\* (Foreign data)

## APPENDIX II

## Average digestibility co-efficients of Indian feeding stuffs

Serial No.	Name of feed	Place of origin	Organic matter	Crude protein	Ether extract	Fibre	Nitrogen free extract	Total carbo-hydrates	Number of tests
<i>Green feeds</i>									
1	Bajra . . . . .	Lyallpur . . . . .	..	62	67	60	69	..	3
2	Berseem . . . . .	" . . . . .	..	81	50	60	80	..	3
3	Elephant grass . . . . .	" . . . . .	..	62	59	63	65	..	3
4	Guara . . . . .	" . . . . .	..	77	39	26	70	..	3
5	Guinea grass (young) . . . . .	Bangalore . . . . .	77	74	47	78	75	77	3
6	Guinea grass . . . . .	" . . . . .	59	58	43	61	52	59	3
7	Ditto . . . . .	Lyallpur . . . . .	..	59	42	58	60	..	3
8	Juar (young) . . . . .	Bangalore . . . . .	62	47	42	66	60	63	3
9	Do. (prime) . . . . .	" . . . . .	58	44	44	59	60	60	9
10	Do. (ripe) . . . . .	" . . . . .	58	25	38	62	58	59	6
11	Do. . . . .	Punjab . . . . .	..	34	37	58	62	..	11
12	Lucerne . . . . .	Bangalore . . . . .	67	80	46	50	72	62	3
13	Maize . . . . .	Lyallpur . . . . .	..	61	65	70	76	..	4
14	Oats . . . . .	" . . . . .	..	72	50	76	79	..	4
15	Serji . . . . .	" . . . . .	..	82	43	58	76	..	3
16	Sudan grass . . . . .	" . . . . .	..	28	32	58	51	..	3
17	Sunflower . . . . .	" . . . . .	..	72	44	20	79	..	2
18	Velvet beans . . . . .	" . . . . .	..	70	64	59	79	..	4
<i>Silage</i>									
19	Juar . . . . .	Bangalore . . . . .	56	40	47	63	53	57	4
20	Maize . . . . .	Lyallpur . . . . .	..	43	53	69	72	..	4
21	Oats . . . . .	" . . . . .	..	52	48	77	61	..	8
22	Ragi straw . . . . .	Bangalore . . . . .	57	8	44	69	52	60	2
23	Spear grass . . . . .	Hosur, Madras . . . . .	59	26	40	69	..	62	12
24	Wheat straw . . . . .	Bangalore . . . . .	57	25	24	65	52	58	2
<i>Hays</i>									
25	Ahmadnagar hay . . . . .	Ahmadnagar . . . . .	51	31	46	..	..	51	2
26	Ajjampur hay (young) . . . . .	Mysore . . . . .	67	49	29	79	61	70	2

27	Ditto (prime)	"	64	36	45	75	58	66	2
28	Ditto (ripe)	"	64	4	40	72	61	66	2
29	Ambala hay	Ambala	..	44	38	57	50	..	2
30	Anjan hay	Meerut	57	35	30	..	..	59	2
31	Aurangabad hay	Aurangabad	52	13	45	57	50	53	6
32	Ditto (young)	"	51	34	45	60	45	52	2
33	Ditto (prime)	"	50	12	42	57	46	51	2
34	Ditto (ripe)	"	47	..	57	53	43	48	2
35	Bangalore hay	Military Grass Farm, Bangalore	54	2	39	63	50	55	9
36	Bellary hay	Bellary	54	11	43	60	52	56	6
37	Boda hay	Cuddapah	44	14	34	51	41	45	2
38	Bolarum hay	Bolarum	52	..	47	59	48	53	34
39	Ditto (young)	"	59	45	28	..	..	61	3
40	Ditto (prime)	"	59	32	38	..	..	61	3
41	Ditto (ripe)	"	52	..	33	..	..	54	3
42	Dalhousie hay	Dalhousie	..	11	30	64	49	..	3
43	Dhub hay	Bangalore	63	73	51	63	54	61	3
44	Ditto	Lyallpur	..	54	27	54	46	..	3
45	Ferozepur hay	Ferozepur	..	58	37	58	50	..	3
46	Guinea grass hay (before flower).	Bangalore	56	54	33	64	49	56	3
47	Ditto (in flower)	"	53	44	28	60	47	54	3
48	Jhelum hay	Jhelum	..	34	35	64	61	..	3
49	Juar hay (young)	Bangalore	57	41	31	67	50	58	6
50	Ditto (prime)	"	56	41	28	60	44	57	12
51	Ditto (ripe)	"	56	14	40	58	57	58	14
52	Jubbulpore hay (young)	Jubbulpore	58	23	29	64	57	60	3
53	Ditto (prime)	"	57	12	39	63	56	59	3
54	Ditto (ripe)	"	52	..	31	59	51	54	3
55	Jullundur hay	Jullundur	..	25	34	65	44	..	2
56	Jutogh hay	Jutogh	..	17	27	58	49	..	4
57	Kasauli hay	Kasauli	..	19	40	60	46	..	3
58	Kollukattai grass hay (young).	Hosur, Madras	68	66	28	..	..	69	3
59	Ditto (prime)	"	63	55	41	..	..	64	3
60	Ditto (ripe)	"	59	47	23	..	..	60	3
61	Lahore hay	Lahore	..	36	26	64	52	..	2
62	Meerut Farm hay	Meerut	48	8	34	..	..	49	18
63	Ditto (young)	"	55	28	25	54	57	56	3
64	Ditto (prime)	"	52	14	31	54	55	54	3
65	Ditto (ripe)	"	51	10	30	51	54	52	3
66	Multan hay (Geneva)	Multan	..	..	21	60	48	..	3

APPENDIX II—contd.

Serial No.	Name of feed	Place of origin	Organic matter	Crude protein	Ether extract	Fibre	Nitrogen free extract	Total carbohydrates	Number of tests
<i>Hays—contd.</i>									
67	Multan hay (Musel)	Multan	..	12	17	62	50	..	3
68	Murree hay	Murree	..	16	37	61	45	..	2
69	Natal grass hay	Mysore	57	43	29	63	54	59	2
70	Oat hay	Lahore	69	46	72	..	..	70	2
71	Ditto	Lyallpur	..	47	74	65	64	..	10
72	Rawalpindi hay	Rawalpindi	..	21	48	65	40	..	2
73	Rhodes grass hay	Bangalore	63	60	33	69	54	63	3
74	Do. (young)	Hosur, Madras.	64	50	33	..	..	68	2
75	Do. (prime)	"	65	55	39	..	..	67	2
76	Do. (ripe)	"	59	49	38	..	..	59	2
77	Rukh hay (ripe)	Bolarum	53	14	48	..	..	55	4
78	Scented grass hay	Cuddappah	56	47	33	64	53	58	3
79	Seguri hay	Seguri	48	52	49	..	..	48	3
80	Sialkot hay	Sialkot	..	40	29	55	50	..	2
81	Spear grass hay (young)	Hosur, Madras	58	42	42	63	50	59	18
82	Do. (prime)	"	50	16	43	57	47	51	18
83	Do. (ripe)	"	55	..	36	..	..	57	18
84	Sugarcane leaves	Bangalore	49	..	26	56	47	51	3
85	Telegaon hay	Telegaon	39	2	40	..	..	40	4
86	Tornagallu hay	Tornagallu	52	2	43	57	50	53	6
<i>Legume hays</i>									
87	Berseem hay	Lyallpur	..	70	29	49	77	..	4
88	Cowpea hay	Mysore	62	68	..	51	62	57	4
89	Groundnut hay	"	61	69	..	39	64	54	5
90	Lucerne hay	Bangalore	63	77	30	51	68	60	6
<i>Straws</i>									
91	Gram bhoosa or straw	Lyallpur	..	40	..	40	47	..	3
92	Ragi straw	Bangalore	60	6	41	69	58	62	40
93	Rice straw	"	60	..	35	72	53	62	24

94	Rice straw (Bengal)	Dacca	51	9	43	62	46	..	(graphic method)
95	Do.	Kangra, Punjab.	49	..	47	61	42	51	3
96	Do.	Pusa	58	..	56	72	43	61	18
97	Wheat straw	Lyallpur	..	..	36	61	53	..	3
	<i>Concentrates : Grain and seed</i>								
98	Cotton seed	"	..	69	90	63	59	..	18
	<i>Concentrates : Cakes and meals</i>								
99	Cotton seed cake	"	..	85	98	74	59	..	..
100	Groundnut cake	Bangalore	75	90	97	10	51	..	24
101	Linseed cake	Bengal	72	85	96	27	67	..	18
102	Sarson cake	Lyallpur	..	85	93	44	74	..	..
103	Toria cake	"	..	84	91	38	61	..	..
	<i>By-products</i>								
104	Gram husk	Bangalore	..	..	85	66	71	70	7
105	Wheat bran	"	76	77	66	20	84	77	10



APPENDIX III

Nutritive value of Indian feeding stuffs

Serial No.	Name	Place of origin	Digestible nutrients per 100 lbs. dry material					Digestible nutrients per 100 lbs. raw material †		
			Crude protein	Carbohydrates	Ether extract	Total	Nutritive ratio	Starch equivalent	Digestible crude protein	Starch equivalent
			Lbs.	Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	
	<i>Green feeds</i>									
1	Bajra	Lyallpur	4.31	52.63	1.02	59.24	12.9	47.6	1.08	11.9
2	Berseem	Bihar	12.56	44.47	1.18	59.68	3.8	43.4	2.51	8.7
3	"	Punjab	14.10	48.23	0.94	64.46	3.6	48.3	2.82	9.7
4	Elephant grass	"	3.85	48.54	1.33	55.39	13.4	38.4	0.96	9.6
5	Guara	"	6.63	40.73	0.67	48.88	6.4	30.9	1.33	6.2
6	Guinea grass (young)	Bangalore	5.83	58.00	0.56	65.09	10.2	42.3	1.46	10.6
7	Ditto	"	4.44	45.23	0.72	51.28	10.6	29.1	1.11	7.3
8	Ditto	Bengal	4.60	44.93	0.74	51.20	10.1	31.9	1.15	8.0
9	Ditto	Lyallpur	3.10	47.72	0.65	52.28	15.9	30.8	0.78	7.7
10	Juar (young)	Bangalore	4.20	50.07	0.91	56.27	12.4	35.8	0.84	7.2
11	" prime	"	3.44	48.86	0.77	54.03	14.7	35.2	1.03	10.6
12	" ripe	"	1.16	51.24	0.45	53.40	45.0	30.8	0.46	12.3
13	" (9 to 10½ weeks)	Bihar	1.26	52.68	0.52	55.12	42.6	36.9	0.25	7.4
14	" (18 weeks)	"	0.88	53.16	0.56	55.29	62.1	37.1	0.26	11.1
15	" (young)	Punjab	2.46	53.16	0.58	56.93	22.2	34.0	0.49	6.8
16	" prime	"	1.67	52.73	0.62	55.80	32.5	35.1	0.50	10.5
17	" ripe	"	0.97	52.02	0.60	54.34	54.9	34.6	0.39	13.8
18	Lucerne	Bangalore	16.19	41.59	1.06	60.17	2.7	41.4	3.24	8.3
19	"	Bihar	18.17	37.34	1.31	58.47	2.2	44.4	3.63	8.9
20	"	Punjab	15.92	40.00	0.83	57.79	2.6	39.7	3.18	7.9
21	Maize	Lyallpur	4.68	60.94	0.96	67.77	13.5	52.3	1.17	13.1
22	"	Bihar	4.14	61.08	1.36	68.28	15.5	46.7	1.04	11.7
23	Oats	Punjab	10.50	53.79	1.07	66.70	5.4	46.6	2.63	11.7
24	Senji	"	12.61	50.01	0.63	64.04	4.1	44.7	2.52	8.9
25	Sudan grass	"	1.57	41.47	0.61	44.41	27.2	28.4	0.39	7.1

26	Sunflower	"	8.55	40.56	1.51	52.50	5.1	37.6	2.14	9.4
27	Velvet beans	"	10.66	49.64	1.37	63.38	4.9	51.1	2.13	10.2
<i>ilage</i>										
28	Juar	Bangalore	2.35	46.93	0.82	51.13	20.8	29.1	0.71	8.7
29	Maize	Punjab	3.41	56.70	0.59	61.48	17.0	46.8	1.02	14.0
30	Oats	"	4.06	55.67	1.09	62.18	14.3	38.2	1.22	11.5
31	Ragi straw	Bangalore	0.30	51.04	0.64	52.78	175.0	30.1	0.09	9.0
32	Speargrass	Hosur, Madras	1.74	47.00	0.66	50.22	27.8	31.0	0.52	9.3
33	Wheat straw	Bangalore	0.86	47.37	0.11	48.48	55.5	25.6	0.26	7.7
<i>Hay.</i>										
34	Ahmadnagar hay	Ahmadnagar	1.20	39.83	0.45	42.05	34.1	20.4	1.08	18.4
35	Ajjampur hay young	Mysore	3.85	54.88	0.30	59.41	14.5	37.7	3.47	38.9
36	Do. prime	"	1.96	54.11	0.43	57.03	28.0	34.0	1.76	30.6
37	Do. ripe	"	0.13	57.72	0.29	58.51	466.3	36.8	0.12	33.1
38	Ambala hay	Ambala	2.45	43.55	0.54	47.22	18.3	26.1	2.21	28.5
39	Anjan hay	Meerut	1.71	49.41	0.25	51.68	29.3	32.4	1.54	29.2
40	Do.	Punjab	2.01	47.54	0.43	50.51	24.2	29.0	1.81	26.1
41	Aurangabad hay	Aurangabad	0.31	42.57	0.70	44.45	144.0	23.2	0.28	20.9
42	Do. young	"	1.43	41.80	0.52	44.40	30.0	23.2	1.29	20.9
43	Do. prime	"	0.30	42.22	0.61	43.89	146.5	21.8	0.27	19.6
44	Do. ripe	"	0.00	39.02	0.75	40.70	..	18.0	0.00	16.2
45	Bangalore hay	Military Grass Farm, Bangalore.	0.05	47.55	0.49	48.71	1048.0	28.0	0.05	25.2
46	Bellary hay	Bellary, Madras	0.27	43.49	0.56	45.01	162.8	23.4	0.24	21.1
47	Boda hay	Cuddappah	0.52	39.89	0.46	41.44	79.1	17.7	0.47	15.9
48	Bolarum hay	Bolarum	0.00	43.72	0.68	45.25	..	23.6	0.00	21.2
49	Do. young	"	2.27	49.05	0.32	52.04	22.0	30.9	2.04	27.8
50	Do. prime	"	1.21	50.03	0.43	52.21	42.2	30.6	1.09	27.5
51	Do. ripe	"	0.00	46.96	0.28	47.59	..	25.3	0.00	22.8
52	Dalhousie hay	Dalhousie	0.38	47.90	0.27	48.88	126.8	26.4	0.34	23.8
53	Dhub hay	Bangalore	8.09	44.21	0.98	54.52	5.7	38.7	7.28	34.8
54	Do.	Bareilly	4.94	38.41	0.26	43.94	7.9	29.4	4.45	26.5
55	Do.	Fyzabad	4.18	37.40	0.91	43.62	9.4	29.6	3.76	26.6
56	Do.	Lucknow	4.09	39.56	1.39	46.78	10.5	34.0	3.68	30.6
57	Do.	Karnal	3.68	38.98	0.17	43.04	10.7	28.8	3.31	25.9
58	Do.	Lyallpur	6.04	36.16	0.38	43.05	6.1	31.9	5.44	28.7
59	Ferozepur hay	Ferozepur	5.23	41.95	0.38	48.04	8.2	28.5	4.71	25.7
60	Guinea grass hay (before flower).	Bangalore	4.09	42.33	0.40	47.33	10.6	24.8	3.68	22.3

APPENDIX III—contd.

Serial No.	Name	Place of origin	Digestible nutrients per 100 lbs. dry material					Digestible nutrients per 100 lbs. raw material †		
			Crude protein	Carbohydrates	Ether extract	Total	Nutritive ratio	Starch equivalent	Digestible crude protein	Starch equivalent
	<i>Hays—contd.</i>		Lbs.	Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	
61	Guinea grass hay (in flower).	Bangalore	2.09	43.89	0.32	46.69	21.3	22.1	1.88	19.9
62	Jhelum hay	Jhelum	1.76	52.14	0.42	54.85	30.1	37.2	1.58	33.5
63	Juar hay young	Bangalore	2.81	47.65	0.42	51.39	17.3	27.5	2.53	24.8
64	Do. prime	"	1.78	48.66	0.32	51.17	27.7	28.4	1.60	25.6
65	Do. ripe	"	0.64	49.99	0.43	51.59	79.8	27.0	0.58	24.3
66	Do.	Punjab	2.25	46.79	0.46	50.07	21.3	27.9	2.03	25.1
67	Jubbulpore hay (young)	Jubbulpore	0.94	50.26	0.42	52.13	54.2	29.5	0.85	26.6
68	Do. prime	"	0.40	51.41	0.44	52.79	130.6	29.8	0.36	26.8
69	Do. ripe	"	0.00	45.94	0.31	46.65	..	23.6	0.00	21.2
70	Jullundur hay	Jullundur	0.88	46.54	0.33	48.17	53.9	24.7	0.79	22.2
71	Jutogh hay	Jutogh	0.64	46.31	0.38	47.81	71.5	24.8	0.58	22.3
72	Kasauli hay	Kasauli	0.81	44.06	0.70	46.44	56.5	24.8	0.73	22.3
73	Kollukkattai grass hay young.	Hosur, Madras	11.17	47.56	0.32	59.44	4.3	42.1	10.05	37.9
74	Do. prime	"	5.49	49.56	0.48	56.13	9.2	35.2	4.94	31.7
75	Do. ripe	"	2.97	49.46	0.16	52.78	16.8	33.2	2.67	29.9
76	Lahore hay	Lahore	1.60	48.36	0.37	50.78	30.8	28.1	1.44	25.3
77	Meerut Farm hay	Meerut	0.25	41.94	0.31	42.89	172.4	20.4	0.23	18.4
78	Do. young.	"	0.99	44.99	0.40	46.88	46.3	27.8	0.89	25.0
79	Do. prime.	"	0.39	44.12	0.48	45.59	114.7	26.9	0.35	24.2
80	Do. ripe	"	0.27	43.76	0.31	44.73	163.1	23.0	0.24	20.7
81	Multan hay (Geneva)	Multan	0.00	45.28	0.26	45.87	..	23.0	0.00	20.7
82	Do. (Musel)	"	0.38	46.53	0.16	47.27	123.9	26.1	0.34	23.5
83	Murree hay	Murree	0.57	46.13	0.70	48.28	81.9	22.6	0.51	20.3
84	Natal grass hay	Mysore	2.42	49.79	0.41	53.12	21.0	28.7	2.18	25.8
85	Oat hay	Lahore	2.40	60.02	0.74	64.09	25.7	46.9	2.16	42.2
86	Do.	Lyallpur	2.62	54.61	1.26	60.06	22.0	38.6	2.36	34.7

87	Rawalpindi hay	Rawalpindi	0.86	44.07	0.77	46.66	53.4	24.1	0.77	21.7
88	Rhodes grass hay	Bangalore	7.38	45.95	0.80	55.13	6.5	38.6	6.64	34.7
89	Do. young.	Hosur, Madras	3.72	53.17	0.39	57.78	14.5	36.2	3.35	32.6
90	Do. prime.	"	5.13	52.20	0.49	58.43	10.4	37.0	4.62	33.3
91	Do. ripe	"	3.11	49.91	0.45	53.02	16.1	29.9	2.80	26.9
92	Rukh hay	Bolarum	0.34	48.23	0.60	49.92	147.9	25.8	0.31	23.2
93	Do. ripe	"	0.39	45.41	0.46	46.83	118.3	28.5	0.35	25.7
94	Do.	Jubbulpore	0.33	47.39	0.43	48.70	144.9	31.8	0.30	28.6
95	Do.	Kirkee, Poona	0.36	43.35	0.42	44.65	122.2	24.7	0.32	22.2
96	Scented grass hay	Cuddappah	3.03	47.99	1.07	53.43	16.6	32.1	2.73	28.9
97	Seguri hay	Seguri	3.02	39.62	0.49	43.74	13.5	21.1	2.72	19.0
98	Sialkot hay	Sialkot	1.94	43.94	0.28	46.52	23.0	23.9	1.75	21.5
99	Spear grass hay (in flower).	Bangalor	0.89	43.00	0.61	45.27	50.0	22.8	0.80	20.5
100	Do. (in seed)	"	0.00	49.09	0.53	50.29	..	28.4	0.00	25.6
101	Do. (young)	Hosur, Madras	2.93	48.76	0.57	52.97	17.1	32.6	2.64	29.3
102	Do. prime	"	0.84	42.78	0.51	44.77	52.4	23.2	0.76	20.9
103	Do. ripe	"	0.00	49.93	0.35	50.71	..	28.4	0.00	25.6
104	Do. early	Bombay	2.47	47.12	0.47	50.65	19.5	30.9	2.22	27.8
105	Do. before flower	"	1.86	49.38	0.42	52.19	27.1	29.5	1.67	26.6
106	Do. in flower	"	0.69	44.17	0.41	45.67	76.9	22.2	0.53	20.0
107	Do. in seed	"	0.00	49.61	0.33	50.34	..	28.1	0.00	25.3
108	Do.	United Provinces.	0.00	49.78	0.29	50.43	..	30.8	0.00	27.7
109	Do.	Murree Hills	2.25	51.13	0.67	54.89	23.4	33.2	2.03	29.9
110	Sugarcane leaves	Bangalore	0.00	45.50	0.36	46.30	..	24.6	0.00	22.1
111	Telegaon hay	Telegaon	0.05	32.60	0.39	33.53	647.8	11.7	0.05	10.5
112	Tornagallu hay	Tornagallu	0.05	45.38	0.52	46.60	1028.0	24.7	0.05	22.2
<i>Legume hays</i>										
113	Berseem hay	Lyalpur	10.29	54.44	0.47	65.79	5.4	47.3	9.26	42.6
114	Cowpea hay	Mysore	10.33	40.13	0.00	50.46	3.9	29.6	9.30	26.6
115	Groundnut hay	"	14.93	34.00	0.00	48.93	2.3	33.8	13.44	30.4
116	Lucerne hay	Bangalore	16.37	38.59	0.42	55.90	2.4	37.7	14.73	33.9
<i>Straws</i>										
117	Gram bhoosa or straw.	Lyalpur	2.41	34.67	0.00	37.08	14.4	11.2	2.17	10.1
118	Ragi straw	Bangalore	0.23	54.55	0.38	55.63	243.5	34.7	0.21	31.2
119	Rice straw	"	0.00	48.86	0.30	49.54	..	30.1	0.00	27.1
120	Do. (Aman)	Bengal	0.28	42.85	0.44	44.13	154.4	24.5	0.25	22.1
121	Do. (Aus)	"	0.44	42.60	0.68	44.57	100.2	24.1	0.40	21.7
122	Do. (Boro)	"	0.50	37.18	0.41	38.59	76.6	21.6	0.45	19.4

APPENDIX III—concl'd.

Serial No.	Name	Place of origin	Digestible nutrients per 100 lbs. dry material						Digestible nutrients per 100 lbs. raw material †	
			Crude protein	Carbohydrates	Ether extract	Total	Nutritive ratio	Starch equivalent	Digestible crude protein	Starch equivalent
	<i>Straws—contd.</i>		Lbs.	Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.
123	Rice straw . . . . .	Kanke Farm, Bihar.	0·00	49·04	0·53	50·23	..	32·2	0·00	29·0
124	Do. . . . .	Pusa, Bihar	0·00	48·33	0·48	49·41	..	29·9	0·00	26·9
125	Do. . . . .	Kangra, Punjab.	0·00	40·71	0·41	41·62	..	20·3	0·00	18·3
126	Do. . . . .	Karnal, Punjab.	0·00	37·11	0·72	38·74	..	20·7	0·00	18·6
127	Wheat straw . . . . .	Pusa, Bihar	0·00	47·65	0·58	48·95	..	24·3	0·00	21·9
128	Do. . . . .	Karnal, Punjab.	0·00	47·31	0·41	48·24	..	25·8	0·00	23·2
129	Wheat bhoosa . . . . .	„	0·00	46·75	0·36	47·57	..	24·5	0·00	22·1
	<i>Concentrates : Grains and seeds</i>									
130	Barley* . . . . .	Bangalore	7·39	75·69	1·30	86·01	10·6	84·6	6·65	76·1
131	Do.* . . . . .	Mona, Punjab	8·97	75·55	0·83	86·38	8·6	84·9	8·07	76·4
132	Cotton-seed . . . . .	Lyallpur	12·49	34·65	18·50	88·77	6·1	85·5	11·24	77·0
133	Gram* . . . . .	Bangalore	14·33	83·27	1·96	82·01	4·7	78·5	12·90	70·7
134	Do.* . . . . .	Pusa	13·37	63·42	2·69	82·83	5·2	79·2	12·03	71·3
135	Do.* . . . . .	Punjab	11·96	64·80	3·14	83·83	6·0	80·2	10·76	72·2
136	Oats . . . . .	„	7·85	57·81	5·70	78·48	9·0	73·4	7·07	66·1
137	Maize* . . . . .	„	8·22	76·90	4·08	94·31	10·5	93·3	7·40	84·0
	<i>Concentrates : Cakes and meals</i>									
138	Cocoanuts' cake* (country mill pressed).	Cochin	21·10	39·75	13·00	90·10	3·3	90·0	18·99	81·8

139	Do.* (expeller)	..	..	22.81	42.12	8.20	83.81	2.7	83.8	20.53	75.4
140	Cotton seed cake	..	Lyallpur	19.42	39.96	8.97	79.56	3.1	67.1	17.48	60.4
141	Cotton seed meal	..	Bangalore	31.65	25.99	12.62	86.04	1.7	83.6	28.49	75.2
142	Groundnut cake	..	..	46.39	14.59	7.97	78.92	0.7	75.9	41.75	68.3
143	Linseed cake	..	Bengal	25.86	31.69	6.33	71.79	1.8	69.1	23.27	62.2
144	Rape cake	..	Pusa	30.92	27.76	12.43	86.77	1.8	82.6	27.83	74.3
145	Sarson cake	..	Lyallpur	30.68	28.46	10.34	82.41	1.7	78.1	27.61	70.3
146	Til cake*	..	Bangalore	42.60	23.36	9.32	86.92	1.0	83.3	38.34	75.0
147	Toria cake	..	Lyallpur	28.51	24.97	11.35	79.01	1.8	75.2	25.66	67.7
<i>By-products</i>											
148	Gram husk	..	Bangalore	0.00	59.59	0.77	61.33	..	47.0	0.00	42.3
149	Rice bran*	..	Hosur, Madras	6.76	35.15	10.00	64.40	8.5	48.3	6.08	43.5
150	Do.*	..	Bengal	9.09	31.69	15.70	76.11	7.4	56.6	8.18	50.9
151	Wheat bran	..	Bangalore	11.80	58.00	2.28	74.93	5.4	56.9	10.62	51.2
152	Do.	..	Pusa, Bihar	8.72	59.10	1.14	70.39	7.1	53.7	7.85	48.3

\* In these cases, foreign digestibility co-efficients have been used for calculation.

† In calculating these values, the dry matter content has been assumed as follows:—

	Per cent.
(a) All air-dry materials, such as dry roughage, cake, grain, etc.	90
(b) Succulent silage	30
(c) Green pasture, green maize, etc.	25
(d) Juar, prime	30
"    ripe	40
(e) Green legumes like berseem and lucerne	20

The nutritive values given in these columns are therefore approximate.