Composition of Our Common Feeds and How to Combine Them

Feeding Stuff.	Total dry matter in 100 lbs.	Digestible nutrients in 100 lbs.				Nutritive ratio	Fertilizing constituents in 1,000 lbs.		
		Crude protein	Carbohydrates	Fat	Total		Nitrogen	Phosphoric acid	Potash
Concentrates.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	1 to	Lbs.	Lbs.	Lbs.
Dent corn	89.5	7.5	67.8	4.6	85.7	10.4	16.2	6.9	4.0
Corn meal or chop	88.7	6.9	69 0	3.5	83.8	11 1	14.9	6.1	3.7
Corn-and-cob meal	89.6	6.1	63.7	3.7	78.1	11.8	13 8	5.8	6.3
Hominy feed, high grade	89.9	7.0	61.2	7.3	84.6	11.1	17.0	12 4	9.5
Gluten feed, high grade	91.3	21.6	51.9	3.2	80.7	2.7	40.6	6 2	2 3
Gluten meal, high grade	90.9	30.2	43 9	4.4	84.0	1.8	56.8	5.5	1.2
Corn bran	90.0	5.8	56.9	4.6	73 1	11.6	15.5	6.2	5.4
Wheat, all analyses	89.8	9.2	67.5	1 5	80.1	7.7	19.9	8.6	5.3
Red dog flour	88.9	14.8	56.5	3.5	79.2	4.4	26.9	20.0	7.6
Standard wheat middlings (shorts)	89.6	13.4	46.2	4.3	69.3	4.2	27.7	21.1	11.8
Wheat bran, all analyses	89.9	12.5	41.6	3.0	60.9	3.9	25.6	29 5	16.2
Wheat screenings	89.8	9.6	47.3	3.6	65.0	5.8	21.3	7.4	7.6
Rye	90.6	9.9	68.4	1.2	81 0	7.2	18.9	7.3	5.7
Oats	90.8	9.7	52.1	3.8	70.4	6.3	19.8	8.1	5.6
Oat dust	93.4	9.1	34.9	4.3	53.7	4.9	20.2	—	—
Barley	90.7	9.0	66.8	1.6	79.4	7.8	18.4	8.5	7.4
Malt sprouts	92.4	20.3	47.4	1.3	70.6	2.5	42.2	16.5	18.3
Brewers' grains, dried	92.5	21.5	30.5	6.1	65 7	2.1	42 4	9.9	0 9
Brewers' grains, wet	24.1	4.6	8.7	1.5	16.7	2.6	9.1	2.4	0.3
Emmer (spelt)	91.3	9.5	63.2	1.7	76.5	7.1	19.0	7.6	5.7
Buckwheat	87.9	8 1	49.7	2.5	63.4	6.8	17.3	10.0	7.0
Cottonseed meal, choice	92.5	37.0	21.8	8.6	78.2	1.1	70 6	26.7	18.1
Flaxseed	90.8	20.6	17.0	29.0	102.8	4.0	36.2	15.0	9.5
Linseed meal, new process	90.4	31.7	37.9	2.8	75.9	1.4	59.0	17.7	13.0
Pea, field	90.8	19.0	55.8	0.6	76.2	3.0	36.6	8.4	10.1
Soy bean	90.1	30.7	22.8	14.4	85.9	1.8	58.4	13 7	24.7
Cow's milk (whole)	13.6	3.3	4.9	4.3	17.9	4.4	5.6	1.9	1.7
Skim-milk (separator)	9.9	3.6	5.1	0.2	9.1	1.5	6.1	2.2	1.7
Buttermilk	9.4	3.4	4.9	0.1	8.4	1.5	5.8	1.7	1.6
Whey	6.6	0.8	4.7	0.3	6.2	6.8	1.6	1.2	2.6
Dried blood	90.3	69 1	—	0.9	71.1	0.3	131.5	4.9	1.2
Tankage (55–60% protein)	92.5	54.0	—	12.7	82.6	0.5	93.0	—	—
Beet pulp, wet	9.3	0.5	6.5	0.2	7.4	13.8	1.4	0.4	0.7
Beet pulp, dry	91.8	4.6	65.2	0.8	71.6	14.6	14.2	2.4	3.8
Distillers' grains, dried, from corn	93.4	22.4	40.4	11.6	88.9	3.0	49.1	6.8	1.7
Distillers' grains, dried, from rye	92.8	13.6	38.0	6.6	66.4	3.9	37.0	8.3	2.4
Distillers' grains, wet	22.6	3.3	13 3	1.5	20.0	5.1	7.2	1.6	0.4
Molasses, beet	74.7	1.1	59.4	—	60.5	54.0	5.6	0.5	56.3
Molassine meal	83.4	5.4	50.3	0.8	57.5	9.6	14.1	—	—
Dried Roughage									
Corn fodder, ears, if any, remaining	91.0	3.5	51.7	1.3	58.6	15.7	12.5	3.7	9.9
Corn stover, ears removed, very dry	90.6	2.2	47.8	1.0	52.2	22.7	9.4	4.5	12.9
Sorghum fodder, dry	90.3	2.8	44.8	2.0	52.1	17.6	11.8	—	—
Bluegrass, Canada	89.3	2.8	48.5	0.9	53.3	18.0	10.6	4.5	23.3
Bluegrass, Kentucky	86.8	4.7	43.5	1.5	51 6	10.0	13.3	5.4	21.0
Millet, barnyard	86.5	5.1	40.5	0.8	47.4	8.3	13.3	5.5	25.3
Millet, common or Hungarian	85.7	5.0	46.0	1.8	55.0	10.0	13.3	3.6	21.5
Mixed grasses	87.2	4.3	44.3	1.2	51.3	10.9	12.2	3.8	16.4
Orchard grass	88.4	4.7	41.1	1.6	49.4	9.5	12.6	4.0	19.4
Quack grass (couch)	94.1	4.1	49.7	1.1	56.4	12.4	11.7	—	—
Red Top	90.2	4 6	45.9	1.2	53.2	10.6	11.8	4.4	18.8
Timothy, all analyses	88.4	3.0	42.8	1 2	48 5	15.2	9.9	3.1	13.6
Oat hay	88.0	4.5	38.1	1.7	46.4	9.3	13.4	8.0	32.7
Alfalfa, all analyses	91.4	10.6	39.0	0.9	51.6	3.9	23.8	5.4	22.3
Alfalfa, first cutting	91.5	9.3	39.0	0.6	49.7	4.3	22.2	5.4	22.3
Alfalfa, second cutting	92.7	11.2	40.2	0.7	53.0	3.7	23.5	5.4	22.6
Alfalfa leaves	93 4	15.8	35.1	1.3	53 8	2.4	36.0	—	—
Clover, alsike	87.7	7.9	36.9	1.1	47.3	5.0	20.5	7.0	17.4
Clover, mammoth red	81.3	6.4	37.2	1.8	47.6	6.4	17.3	6.3	8.7
Clover, red, all analyses	87.1	7.6	39.3	1.8	50.9	5.7	20.5	3.9	16.3
Clover, sweet, white	91.4	10.9	38.2	0.7	50.7	3.7	23.2	6.6	12.6
Clover, white	91.9	11.8	43.3	1.5	58.5	4.0	25.9	5.2	20.0
Cowpea, all analyses	90.3	13.1	33.7	1.0	49.0	2.7	30.9	9.6	41 3
Pea, field	88.9	12.2	40.1	1.9	56.6	3.6	24.2	6.7	12.4
Clover and timothy	87.8	4.0	39.7	1.1	46.2	10.6	13.8	4.7	19.0
Peas and oats	83.4	8.3	37.1	1.5	48.8	4.9	18.2	6.6	16.4
Barley straw	85.8	0.9	40 2	0.6	42.5	46.2	5.6	1.8	12.0
Oat straw	88.5	1.0	42.6	0.9	45.6	44.6	5.8	2.1	15.0
Oat chaff	91.8	2.2	31.3	1.2	39.2	16.8	9.4	1.3	4.5
Wheat straw	91.6	0.7	35.1	0.5	36.9	51.7	5.0	1.3	7.4
Wheat chaff	85.6	1.1	25.7	0.6	28.2	24.6	6.7	4.0	8.4
Bean	89.5	3.6	42.4	0.7	47.6	12.2	11.7	4.2	13.6
Roots and Tubers.									
Beet, sugar	16.4	1.2	12.6	0.1	14.0	10.7	2.6	0.8	3.2
Carrot	11.7	0.9	8.6	0.2	9.9	10.0	1.9	1.1	2.7
Mangel	9.4	0.8	6.4	0.1	7.4	8.2	2.2	0.4	2.2
Potato	21.2	1.1	15.8	0.1	17.1	14.5	3 5	1.2	5.3
Turnip	9.5	1.0	6.0	0.2	7.4	6.4	2.2	1.3	2.9
Apple	18.2	0.4	15.6	0.2	16.4	40.0	0.8	0.3	1.6
Apple pumace	23.3	1.2	15.6	0.8	18.6	14.5	2.6	0.6	1.5
Cabbage	8.9	1.9	5.6	0.2	7.9	3.2	3.5	0.7	2.9
Kale	11.3	1.9	4.7	0.3	7.3	2.8	3.8	—	—
Pumpkin, field	8.3	1.1	4.5	0.5	6.7	5.1	2 0	0.9	3.2
Rape	16.7	2.6	10.0	0.3	13.3	4.1	4.6	1.1	3.9
Sugar beet tops	11.4	1.7	5.4	0.1	7.3	3.3	4.2	1.0	6.4
Turnip tops	15.0	1.8	7.3	0.1	9.3	4.2	4.5	1.5	5.2
Silage.									
Corn, well matured	26.3	1.1	15.0	0.7	17.7	15.1	3.4	1.6	4.4
Corn, immature	21.0	1.0	11.4	0.4	13.3	12.3	3.0	1.2	3.5
From frosted corn	25.3	1.2	13.7	0.6	16.3	12.6	3.5	1.5	4.3
From field-cured stover	19.6	0.5	9.9	0.4	11.3	21.6	2.2	—	—
Alfalfa	24.6	1.2	7.8	0.6	10.4	7.7	5.6	—	—
Clover	27.8	1.3	9.5	0.5	11.9	8.2	5.9	—	—
Corn and clover	28.6	2.1	15.9	0.7	19.6	8.3	5.3	—	—
Oat and pea	27.5	2.8	12.6	1.0	17.6	5.3	6.1	1.7	7.0

How to Interpret the Table.

Such a table as appears on this page requires some explanation. At first sight it may appear complicated and scientific, but to the most obtuse mind it will convey some information, and to others it will reveal facts according to the amount of consideration they have given to feeding stuffs and to the efforts they have expended in trying to apply what they have learned. The figures will reveal much to the chemist, but the practical feeder, better than anyone else, is in a position to derive benefit therefrom, for he knows feeds, he knows animals, and he knows whether his charges are responding to certain mixtures, when the exclusively scientific man would be blind to anything but the composition of the materials. Thus the work of the best chemists and live-stock investigators in Europe and America can be placed before the public so the man who needs information can make use of it in a practical way. Standard books on feeding contain such tables in a more extended form than is reproduced here. These are excerpts from a full table appearing in Henry's "Feeds and Feeding," and we have chosen only those feeds as come to our attention most frequently in Canada. Feeding has become a science. Those who have grasped the fact can make good use of this table; while those who continue to throw feed to their live stock without any consideration of its composition or effect on the animal system will continue on the highway trod by those who "just get along."

One glance at the table will show a simplicity that the casual reader would never expect. Take for instance the fertilizing value of dent corn, the first item. We learn from the right-hand side that in 1,000 lbs. of corn there are 16.2 lbs. of nitrogen, 6.9 lbs. of phosphoric acid, and 4 lbs. of potash. One ton of dent corn would, of course, contain just twice these amounts. Then if one should purchase a ton of this material to feed he can arrive at the approximate fertilizing value of it to his land after it passes through his live stock. Animals will incorporate some of the constituents into their systems or return it as milk, and this depends much on the kind of animal and the work it is doing. Such a factor is not exceedingly important and for the moment we may disregard it, considering that all the fertilizing constituents are voided as solid or liquid manure. Before the war we were paying about 20 cents per pound for nitrogen, and approximately 5 cents per pound each for phosphoric acid and potash; when obtained in the form of commercial fertilizer. These prices have been altered considerably during the last two years, but for normal times we may consider them substantially correct. Consequently, in one ton of dent corn there would be 32.4 lbs. of nitrogen, which, at 20 cents per pound is equivalent to $6.48. There would also be 13.8 lbs. of phosphoric acid and 8 lbs. of potash, making 21.8 lbs. at 5 cents, or $1.09 worth of fertilizing ingredients. This with the nitrogen would make $7.57 worth of fertilizing constituents purchased with each ton of corn, and the greater part of which would be applied to the soil. Referring to oil cake or cottonseed meal, we find they have a much higher content of nitrogen and are consequently worth much more for their residual effect. In fact, cottonseed meal was formerly applied to the soil direct as a fertilizer without being fed at all. With this brief explanation we can leave the three columns to the right of the table and consider the different feeds from the feeding viewpoint.

What Feeds Contain.

Starting at the left-hand column of figures, we find the heading, "Total dry matter in 100 lbs." Some might think that timothy hay and corn are dry matter, and they are, to a certain extent, but the former has in the neighborhood of 11 lbs. of moisture in each 100 lbs. of hay, while corn has in the vicinity of 10 lbs. of moisture to each 100 lbs. Feeds for live stock are calculated on the dry-matter basis, hence the significance of this column.

Regarding protein, carbohydrates and fats, little need be said here, except that a certain amount of each material is required to maintain the animal system in such a way that it will function normally. If more protein than is needed is taken into the system it is wasted, and, more than that, the energy used up in digesting it is likewise thrown away. If corn were the only feed being consumed, a considerable quantity would be required to supply sufficient protein, because it is low in that constituent. In an effort to satisfy the body requirements for protein, more carbohydrates, in which corn is high, than necessary would be digested and much of the carbohydrates voided in the manure without performing any useful function. If some oil cake or cottonseed meal be added to the corn, much less will be needed, for one will supply the protein and the other carbohydrates. This is called a balanced ration when the relation between the two is such as to fill all the requirements of the body without a waste of either protein or carbohydrates.

Carbohydrates and fats serve much the same purpose, but fat is 2¼ times more efficient than a similar quantity of carbohydrates. Thus when it is desirable to compare the protein of a certain feed with the carbohydrates and fats, we must first express fat in the terms of carbohydrates. Taking corn again as an example, we find that in 100 lbs. there are 4.6 lbs.