Next as to the fat: deducting the amount of the digestible fat supplied in the total food from the fat in the increase, there remain in the respective cases 63.7, 65.2, 61.4, 65.7, and 63.8 parts, which must have been newly formed. There is next shown the amount of this which may have been derived from the available nitrogenous substance of the fixed food, and it is seen that there remain 54.2, 56.6, 57.5, 54.2, and 52.5 parts out of the total of 74, in the 100 of increase, that must have been derived from other sources, in fact, either from the nitrogenous substance of the roots, or from the carbohydrates of the fixed food and the roots.

The next question is, whether the nitrogenous substance of the roots could have yielded the amounts of fat indicated to have been produced from other sources than the fat of the total food, and that derivable from the available nitrogenous substance of the fixed foods. Comparing the figures in the bottom line of the lower division of the table with those in the bottom line of the upper division it is seen that even on the impossible assumption that the whole of the nitrogen of the mangels existed in compounds of the same fat-forming value as the albuminoids, in neither of the five cases would the amount so available completely supply the amount required.

The amount of true albuminoid nitrogen varies very much in different descriptions of roots, and in the same description according to season, maturity, etc. Thus, at Rothamsted, we have found it in mangels as low as 20.5 per cent of the total nitrogen under unfavorable conditions of growth and ripening, and as high as 44.2 under favorable conditions. We generally assume in calculation that 40 per cent of the nitrogen of mangels will, on the average, exist as albuminoids, and Wolff's average figure, as given in 1888, is 36.1 per cent. The amount existing as amides will probably, in most cases, vary from 40 to 50 per cent or more, while there is frequently a considerable quantity as nitrates, the more the less ripe the roots, and we have sometimes found the amount to be more than 10 per cent of the total nitrogen of the roots.

It is clear, therefore, that even supposing as little as 50 per cent of the nitrogen of the roots to be available for, and capable of fat formation as assumed in the top line of the lower division of the table, that amount would generally include other than albuminoid compounds. Nevertheless, Wolff, in his table, assumes the whole of the nitrogen of roots to be digestible and available for the purposes of the system, since it has been shown that amides are transformed in the body and yield urea, leaving, therefore, by-products of transformation available for expenditure in respiration, and so protecting the true albuminoids or the carbohydrates.

(To be continued.)

APPLES AS FOOD FOR STOCK

Cheap fruit—Digestibility—Analyses—Succulent fodder—Increased palatability of other foods.

The abundant apple crop of the past season has so affected the market price of this fruit that only that of first class quality can be disposed of at remunerative figures, indeed, in many markets none but the best is at all saleable. Farmers and orchardists in many districts, therefore, find themselves this year with a large quantity of second and third class fruit, in addition to the usual amount of windfalls and wormy apples, all of which must be used upon the farm or allowed to rot on the ground.

It is on account of the above stated facts, no doubt, that we have received so many enquiries during the past month respecting the value of apples as a cattle food, and it is to give information on this interesting and important subject a wide circulation that this article is penned for the readers of the "Journal of Agriculture."

To obtain a clear and intelligent knowledge of the value of any fodder, the first step is to study its composition and digestibility by the light of chemistry. Several years ago, in order to place ourselves in possession of reliable data that would assist us in giving advice towards a more rational method of fertilizing orchards than had been in vogue, we analysed in the Farm laboratories four well known varieties of apples. Wealthy, Fameuse, Northern Spy and Duchess of Oldenburg. The details of this investigation are to be found in the annual report of the Experimental Farms for 1894. For our present purpose it will not be necessary to quote these in full; to arrive at a conclusion respecting the feeding value of this fruit, the following averages will suffice:

APPLES

Water....	86.98
Organic matter....	12.74
Ash or Mineral Matter... ...	28
	100.00

This "organic matter" (which comprises the food constituents) is made up as given in the subjoined table.

COMPOSITION OF ORGANIC MATTER OF APPLES

Albuminoids (nitrogenous substances)....	27
Fat..	19
Carbo-hydrates (sugar, pectin, etc)	11.45
Fibre.....	83

The above data show that apples must be classed with the succulent fodders and, as the annexed figures also obtained in our laboratories go to prove, are in a large measure comparable to roots in their feeding value:

	Carrots.	Turnips	Mangels
Water.....	90.49	90.31	91.29
Organic matter.	8.62	8.96	7.72
Ash.....	.89	.70	.99
	100.00	100.00	100.00
Albuminoids....	.75	1.03	.94
Fat.....	.03	.05	.03
Carbo hydrates.	6.93	6.58	5.99
Fibre..... ...	.93	1.30	.76

The chief differences to be observed between apples and the above roots may, therefore, be summarized in the following paragraphs:

1. That apples contain a large percentage of organic matter or total food constituents.

2. That this is due to the carbo-hydrates (heat producing elements) the amount of which is about double that in the roots quoted.

3. That the percentage of albuminoids (flesh formers) in apples is much less than in roots, in most instances not more than one-third the amount.

4. That the percentage of oil or fat is greater in apples than in roots, the ratio being about four to one.

We may conclude, therefore: (1) That apples have a distinct value as food. Practical experience has corroborated this deduction of science.

(2) That taking into consideration the larger amount of carbo hydrates and the smaller percentage of albuminoids, we shall not be far from the truth in assigning to apples a feeding value approximately equal to that of roots. From the latter, however, sugar beets must be excepted, since they have a special value of their own, due to the presence of a large amount of sugar.

One word may here be said as to the digestibility of apples. No records of any direct trials to establish coefficients of digestibility are known to the writer, but such facts as have been established all point to a high degree of digestibility. No practical error would be introduced by assuming that at least 90 p. c. of the food constituents is digested.

All dairymen recognize the importance of a succulent fodder (as part of the ration) for keeping up the milk flow, and there are data from reliable men on record to show that apples exert a beneficial effect in this respect. No difference has been observed between sweet and sour apples in feeding value; the probability, however, is that the former, from the sugar they contain, would be more valuable. (1)

Apples cannot be used exclusively. For cattle they must be supplemented with grain and hay. For pigs, horses and poultry also they can only be used with safety and economy as part of the ration. A practical and fairly accurate way would be to consider apples as being well able to furnish the succulent portion of the ration.

Begin their use in small quantities of from one to two quarts per cow per day. The amount may be gradually increased until it reaches half a bushel. The apples should be first chopped or pulped, to prevent danger from choking, and used with the meal.

Though the food value of apples, as expressed by their composition, is not high, it seems quite reasonable and probable to suppose that they possess an additional value by virtue of the fruit acids and flavouring substances they contain. It may well be imagined that these would have the tendency to increase the palatability of the other foods and assist in its digestion.

We know that to allow the fallen and wormy apples to rot in the orchard means assisting in the propagation of injurious insects that will infest the fruit the coming season; but we now learn that such a practice is extremely wasteful. By using judgment on the lines indicated, this surplus fruit may be used to excellent purpose and a profitable return obtained. This is not only indicated by the chemical data on the subject, but is substantiated by the experience of advanced dairymen.

FRANK T. SHUTT.

(1) The bitter cider apple contains much more sugar, after being mellowed in heaps, than the sweetest of dessert fruit. conversion of starch into sugar?—Ed.

The Dairy.

STILTON CHEESE AND HOW TO MAKE IT.

Characteristics—Rennetting—Care in Draining—Coat Formation—Curing—A Prime cheese.

The process of making a Stilton cheese has more similarity to that of the manufacture of some of the Continental cheeses than any other British make.

Despite this fact, it is a British cheese, and the county of Leicestershire, can justly claim the honor of being its home. Indeed, many people consider that it is impossible to make the real article outside the county named. This, however is an error as with suitable buildings and utensils, with perfect cleanliness and with sufficient skill on the part of the maker, prime Stilton, can be made in any district. The cost of producing a Stilton however, is greater than that of a Cheddar or Cheshire. This is owing to the greater cost of the buildings, the greater amount of labour, the longer time taken in curing, and lastly, to the fact that less ripe cheese is obtained from a given amount of milk by the Stilton method, than by the methods just mentioned.

The Stilton is popularly supposed to be a cream cheese, but at the present time it is almost always made of whole milk, without the addition of cream, and yet the quality produced leaves nothing to be desired. Nevertheless the milk intended for making Stilton should be at least of average quality, and that produced by cows grazing on rich old pastures is the most suitable. The giving of large quantities of cake to the cows is not to be recommended, as this usually produces a milk that causes trouble during the making of the cheese.

In the method of manufacture about to be described two separately made curds are used. This method is the one by which the best Stiltons are made.

One reason why this is so, is found in the fact that separately made curds, do not unite so closely as curds made at one operation. This consequence is, that a great amount of air space is got in the body of the cheese, and therefore fulfillment of one of the conditions, essential to the developement of the mould, which it is the pride of the Stilton maker to obtain. For much of the following valuable information, I am indebted to one of the most practical, and at the same time most successful, Stilton cheese manufacturers in Melton Mowbray (England) the centre of this industry. I fervently trust that this information may be so practically applied that we may see Canadian Stiltons, competing for favor, with those of the Mother country.

Before commencing operations the maker should have in remembrance the leading characteristics of an ideal Stilton. They are as follows: A drab colored rough wrinkled skin, a texture salvy and mellow, but not soapy (indeed, as the old Stilton maker's maxim says, "beware of chalk, and beware of soap", which implies medium textures, and avoidance of hardness on the one hand, or soapiness on the other), a marbling throughout the body of the cheese due to the growth of a blue mould (Poncillium glaucum), and the possession of an unique flavour.

The following is a list of requisites for the manufacture of Stilton: (a) Building. The building or dairy must be divided into at least three separate apartments, or better still, into four. These are: (1) A setting room and a draining room. One room may be made to serve the double purpose of setting and draining, or a separate room may be used for each purpose. (2) A drying or coating room (3) A storing or curing room Besides these a cellar is a great advantage, as the cheeses can be taken there when they are ripe, or even before they are ripe, the wea-