

Feeding Standards from maintenance and Growth

Feeding standards are the tables, which indicate the quantities of nutrients to be fed to the various classes of livestock for different physiological functions like growth, maintenance, lactation, egg production and wool growth.

The basic nutrients that animals require for maintenance, growth, reproduction, and good health include carbohydrates, protein, fat, minerals, vitamins, and water. The energy needed for growth and activity is derived primarily from carbohydrates and fats. There are two types of animal feeds are: Roughage and Concentrates.

If feeding stuffs are to be used to their full advantage, then it is essential for us to know something of their relative merits and of their effects upon the animal. Further, if they are to be quantitatively compared with each other, their value must be first expressed in terms of some unit, and their quantitative effect on the animal must also be measurable in these same units

Studies of digestibility soon made it obvious that the total quantities of fats, proteins, and carbohydrates in a feed were not a true measure of its worth to the animal, and so the emphasis passed to digestible fats, digestible proteins, and digestible carbohydrates. In other words, it was recognized that part of the feed is lost as faeces and is of no use to the animal.

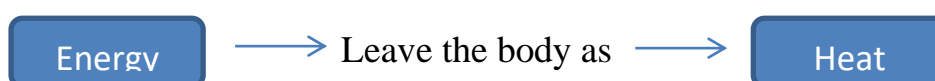
The final stage was the recognition that even when a constituent of the feed has actually been digested and absorbed into the body of the animal there may still be losses which vary under different conditions. Thus there are losses in the urine and breath and losses as heat from the lungs and skin.

The amounts of nutrients required by animals are often described by the general term 'feeding standards. Two other terms used in the same context are 'nutrient requirements' and 'nutrient allowances. Neither of these terms is strictly defined. However, nutrient requirements : a statement of what animals on average require for a particular function . While nutrient allowances is greater than this amount by a safety margin designed principally to allow for variation in requirement between individual animals.

A nutrient requirement is generally agreed to be the average amount required for a particular function, whereas a nutrient allowance is greater than this by a safety margin designed primarily to allow for variations in the requirement between individual Animals.

Feeding standards may be expressed either as quantities of nutrients or in dietary proportions . Various units are used for feeding standards. For example, the energy requirements of ruminants may be stated in terms of net energy (NE), metabolisable

energy (ME), digestible energy (DE) or feed units, and their protein requirements in terms of crude protein (CP), digestible crude protein (DCP) or metabolisable protein (MP). It is desirable that the units used in the standards should be the same as those used in feed evaluation. Standards may be provided separately for each process of the animal or as overall figures for combined processes. For example, the requirements of cattle and sheep are often given separately for maintenance and for milk production. Individual variations between animals, and between samples of a food, must always be considered when applying feeding standards as such variation will inevitably lead to inaccuracies. For this reason, feeding standards should be considered as guides to feeding practice and not as inflexible rules; they do not replace the art of the farmer in the finer adjustment of food intake to animal performance. The application of feeding standards is not restricted to individual animals; they can also be used at farm scale to calculate.



Feeding standards have been developed in many other countries. In USA, the standards used have been developed by the National Research Council (NRC).

National Research Council (N.R.C.) standard

The standard includes digestible protein and total digestible nutrients and also includes the recommended requirements for calcium, phosphorus, carotene and vitamin D for dairy cattle, beef cattle, pigs, poultry, sheep dogs, horses, laboratory animals etc

- The various feeding standards of the world which are available for feeding of different categories of livestock are given below:

Name of the country	Protein	Energy
NRC (USA)	CP, DCP	TDN, DE, NE
ARC (UK)	DCP, AP	DE, ME
SCANDINAVIA	DTP	FEED UNIT
GERMAN	DCP	SE
INDIA	DCP	TDN, ME

CP = Crude Protein

DCP = Digestible Crude Protein

DTP = Digestible True Protein

AP = Available Protein

NE = Net Energy

TDN = Total Digestible Nutrient

SE = Starch Equivalent

DE = Digestible Energy

ME = Metabolizable Energy

Nutrient Requirements For Maintenance

An animal is in a state of maintenance when its body composition remains constant, when it does not give rise to any product such as milk, and when it does not perform any work on its environment. As animals are rarely kept in this non-productive state, it might seem of academic interest to determine nutrient requirements for maintenance; however, the total requirements of many classes of animal, particularly ruminants, are calculated factorially by summation of the requirements for maintenance and production. Consequently, knowledge of the maintenance requirements of animals is of practical as well as theoretical significance.

Animals deprived of food are forced to draw on their body reserves to meet their nutrient requirements for maintenance. We have seen already that fasted animals must catabolize body reserves to provide the energy required for essential body processes such as respiration and circulation of blood. As the energy so utilized leaves the body as heat, the animal is then in a state of negative energy balance. The same is also true of other nutrients; for example, an animal fed on a protein-free diet will continue to lose nitrogen in its faeces and urine and is therefore in negative nitrogen balance. The purpose of a maintenance diet is to prevent this drain on body reserves, and the maintenance requirement for a nutrient can be defined as the quantity required to ensure that the animal experiences neither a gain nor a loss of that nutrient.

Nutrient Requirements For Growth

As animals grow they increase in both size and weight. All animals start their lives as a single cell weighing almost nothing, and then grow to reach mature weights that range from 2 kg for a laying hen to over 1000 kg or more for a bull. The pattern by which animals grow from conception to maturity can be represented by a sigmoid (s-shaped) curve, as presented in Fig. 14.2. During the fetal period and from birth to puberty, the rate of growth increases; after puberty, it progressively decreases as the animal reaches maturity. In practice, a number of factors such as the animal's environment and nutrition may cause its growth to deviate from this sigmoid curve. Periods of food scarcity (cold or dry seasons) may retard growth or even cause the animal to lose weight, after which periods of food abundance will allow the animal to grow more rapidly. In general, animals kept under conditions of so-called 'intensive' husbandry will follow the growth curve illustrated in Fig. 14.2, whereas those kept under natural (extensive) conditions will follow more interrupted curves, with their overall growth rate being more variable than the idealised pattern.

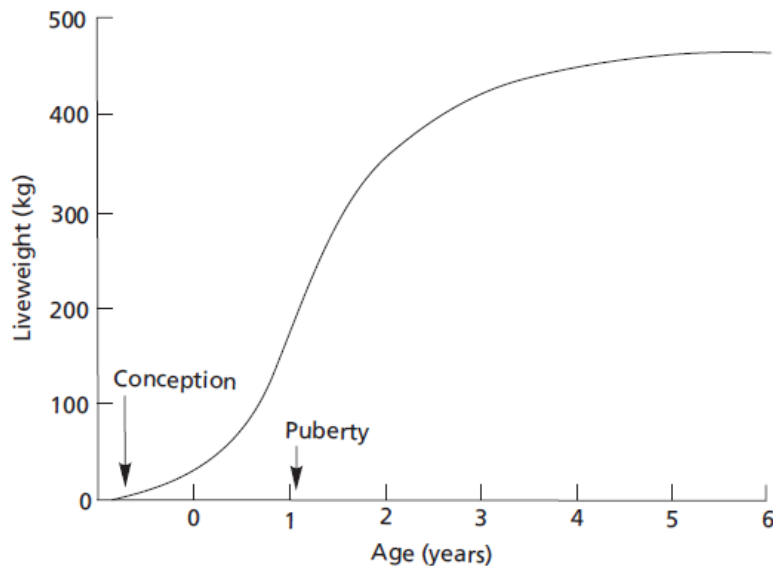


Fig. 14.2 The typical sigmoid growth curve of a dairy cow.

Notes about feeding standards

- Feeding standards are statements or quantitative descriptions of the amounts of one or more such nutrients needed by animals.
- Feedings standards are the tables, which indicate the quantities of nutrients to be fed to the various classes of livestock for different physiological functions like growth, maintenance, lactation, egg production and wool growth.
- The nutrient requirements are generally expressed in quantities of nutrients required per day or as a percentage of diet.
- There are two terms, which has been used, in the feeding standards. One is the nutrient allowance and another is the nutrient requirement.
- The former gives an extra allowance of nutrient over the requirement, which gives a margin of safety whereas latter term gives the requirement for optimum production.

Classification of Feedstuffs

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