

Animal Requirements

1. Requirement tables should be used as a guide, but not considered the exact requirement.
2. Believed to be the minimum requirement for an average animal, but animal requirements may vary considerably.
3. Other factors can affect requirements.
4. No allowance is given in requirement tables for stress, disease, parasites, temperature, feed additives, breed, genetic potential, etc.

Factors that affect nutrient requirements:

1. Species
2. Breed (not in tables)
3. Weight
4. Body condition (not in tables)
5. Age
6. Sex
7. Growth
8. Stage of gestation
9. Level of milk production
10. Work (except for horses, not in tables)
11. Environment (not in tables)
12. Others (genetic potential, disease, stress)

The nutrient requirements can be broken down into four principal components: Maintenance, Lactation, Growth, and Reproduction. From these components, requirements for energy, protein, minerals, and vitamins are calculated. By understanding the different factors that affect requirements, producers can make adjustments to changes such as a month of cold weather, moving to a hilly pasture, or the last third of pregnancy.

Maintenance

The maintenance component includes all the nutrients required for the animal to breath, move, digest food, keep warm, repair tissues, and maintain body weight.

Weight, age, breed, physiological status, activity, and environmental conditions are the primary variables impacting maintenance requirements.

The larger the animal, the greater its maintenance requirement, especially energy and protein.

Extremely heavy muscled breeds will have greater maintenance requirements than light muscled breeds.

Pregnancy and lactation increase basal metabolism, so maintenance requirements are altered accordingly.

Heavy milking breeds have an increased maintenance requirement.

Increased activity or rough terrain will increase maintenance energy needs as will extremely cold, hot, wet, or muddy conditions.

The only true livestock animal at maintenance is a mature gelding, with no physical activity.

Lactation

Heavy lactation has greater nutrient demands than any other production state.

Nutrient requirements for lactation are based on the amount of milk at peak lactation and the composition of the milk.

Animals that produce more milk, and milk with more fat and protein, will have higher nutrient requirements.

Growth

Measured as an increase in body weight.

Most rapid early in life, declines gradually until puberty, then even slower rate until mature size is reached.

Requirements for growth are determined by actual weight, average daily gain (growth rate), weight at maturity, and composition of gain.

Composition of gain simply means whether animals are putting on more muscle or more fat.

For example, protein requirements will be higher for young animals because they are gaining more muscle than fat.

As animals reach maturity, gain then has a larger percentage of fat, and requires relatively more energy.

Nutrient requirements per unit body weight are greater for younger animals.

Efficiency is greatest when growth rates are very rapid.

Following a period of subnormal growth caused by energy restriction, young animals will gain weight at faster than normal rates (compensatory growth or gain).

When mature animals need to gain weight to increase their body condition score, this is also considered growth.

Reproduction

Adjustments to requirements for reproduction are based on expected birth weight and stage of gestation.

Requirements include development of maternal tissue as well as the fetus.

Usually, pregnancy does not significantly affect requirements until the last one-third of pregnancy when the fetus is growing rapidly.

Nutrient deficiencies prior to breeding may result in low fertility or failure to maintain pregnancy.

Underfeeding during growth can result in delayed sexual maturity.

Fetal tissues have priority for nutrients over maternal tissues.

Body reserves may be depleted.

IMPORTANT POINTS:

1. In tables, dry matter intake per day or per animal **IS NOT A REQUIREMENT**, but is considered a guideline as to the max amount the animal can eat.

2. In sheep tables, requirements are grouped by stage of gestation, weight, level of milk production (ie. lactation curve), singles vs twins (because of greater milk production necessary).
3. In cattle tables, grouped by weight, level of milk production, months since calving. Months 7 through 12 are the same requirements regardless of level of milk production because they are so far along on the lactation curve that milk production is not a very large part of requirement. Notice that requirements are expressed both as nutrient density in diet (%) and as amount per day. Explain why amount per day is a better way to look at requirements. The amount of a nutrient that an animal consumes per day if you go by % of the nutrient in the diet, depends ENTIRELY on how much intake is. Less intake means less nutrient consumption, even if the diet is “balanced” for 10% CP.

Example:

Diet is balanced for a 1,300 lb cow, 20 lb peak milk, 2nd month since calving. Requirement is 10.5% CP in diet. Say that diet is balanced for 10.5% CP. This assumes that she is eating 29.1 lb DM as the table estimates. ($29.1 \text{ lb DM} \times 0.105 = 3.1 \text{ lb CP}$) What if her intake, for some reason, is not what NRC estimates it is and she is only eating 25 lb DM. $25 \text{ lb DM} \times 0.105 = 2.6 \text{ lb CP}$. So even though the diet is “balanced” she’s not getting enough CP. This is why using AMOUNTS per day of nutrient requirements is IMPORTANT!