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When developing a feeding program for a horse, the goal is to take sources of nutrients (feeds) and use them in amounts to meet the horse's nutrient requirements. The nutrient requirements are established by the national Academy of Sciences and are found in the Nutrient Requirements of Horses. The sixth revised edition was released in January of 2007. This publication provides the levels of nutrients that are used as the minimum requirements for the horses being fed; it is the place to start. **The New NRC 2007**

The long awaited (at least by this equine nutritionist) publication builds on the information found in the 1989 version, with an extensive review of the new research information that has been reported since that edition was written.

In the 2007 NRC, not only will you find extensive reviews on the different nutrients and how they impact the different classes of horse but also on feedstuffs and an expanded section on feeding management. Within the section feeding management the authors have included discussions on a number of nutritionally related disorders such as laminitis and colic. Also for the first time in this publication, there is a chapter on the nutritional needs of donkeys and captive wild equids.

In the 1989 version, a computer disk was provided to allow people to use the nutrient requirement program and develop a requirement profile for the horses they were feeding. This use of a computer aided system of developing nutrient profiles was a welcome addition to the NRC 1989 as it meant that specific horses could be identified and requirements determined. Prior to that, requirements were in table format only. If you had horses outside those table values requirements were determined by a process of extrapolation between the closest values. With the new edition, users can access the computer program at [www.nap.edu](http://www.nap.edu). This web-based program can be downloaded to your computer for access as needed.

While the book does have a series of tables that list requirements for all classes of horse with weights ranging from 200 – 900 kg, the web based program allows you to customize your requirement listing to specific horses on your farm.

Another area which has received attention is that of carbohydrates and how they are classified. This is a significant area of interest in the horse industry as horse owners try to maintain their horses but have concerns over the various carbohydrate fractions that may be in their feeds either the forages or the concentrates being fed.

Under the topic of feed management, the authors have discussed the area of feed processing and how processing may affect not only nutrient availability but also site of nutrient absorption in the horse. In next chapter, evaluation of feeds is discussed. With the new classification of carbohydrates, it is important to be able to interpret the analysis of the feed using some of these new techniques and understand what the report actually means.

The 2007 edition has a chapter on ration formulation. Working through the examples in the book will provide horse owners insight on how to use the web-based program to evaluate their basic feeding programs.

This has been a very brief discussion on some of the highlights of the information included in this 340 page document which is a significant increase in the quantity of information found in the 1989 version.

What does it mean to you, the horse owner?

The 1989 version of the NRC for Horses used a mathematical model of nutrient: calorie ratios to determine what horses required relative to their physiological state. In simple terms as calorie needs increased or decreased, so did all other nutrients in a specific ratio. While this is

an effective method for feeding some classes of livestock, it was not always considered the best method for determining what the horse needs. A good example would be a horse living in Alberta during the winter. As the temperature drops, the horse's need for energy (or calories) would increase to meet the new maintenance requirement caused by the decreasing temperatures. This increase in energy needs due to cold would not necessarily produce and increase in any other nutrient but the model would increase the other nutrients as the calorie requirement increased. This in effect could cause horse owners to supplement at levels not required by the horses being fed.

In the 2007 edition, a significant number of the nutrient needs are based on the horse's body weight. This model provides equations to calculate energy, protein, calcium, phosphorus, magnesium, potassium, sodium, chloride, copper and vitamins A, D, E, thiamine and riboflavin requirements. For the minerals, I, Fe, Mn, ZN and Se, these requirements are based on dry matter intake of the horse which is similar to how these requirements were calculated the 1989 edition.

Determining a horse's maintenance energy requirement is always a challenge. A common question is what to do with an easy keeper. In previous editions of NRC, basic maintenance requirements would be calculated, a diet developed, and then the horse owner would need to adjust it as needed, based on their evaluation of how the horse responded to the feeding program. With NRC 2007, the maintenance energy requirement can be adjusted by taking into account the individual horse. If the horse is an easy keeper you would select the low requirement while the hard keeper would need the high maintenance requirement. These differences are based on the activity level of the individual horse and give a better starting point for developing the feeding program. While this allows the nutritionist to make initial adjustments to the program the horse owner will still need to monitor the horse's response to the ration as horses need to be fed as individuals.

For those feeding broodmares, the previous editions all considered the early gestation mare to be equivalent to a horse at maintenance. In fact, the nutrient needs for gestation did not start until the 9th month of gestation and then were changed during the 9th, 10th and 11th month. In NRC 2007, adjustments for gestation requirements begin as the mare is in the 5th month of gestation. In addition to nutrient needs for the different months the program also predicts a daily gain for the mare and a change in her body weight a gestation progresses. As the mare gains weight during gestation, it is easier to adjust her feed intake based on this on going estimation of body weight.

As with the mare during gestation, the lactating mare requirements have also been expanded to

include each month of lactation up to the sixth month. Prior to this, lactation requirements were restricted to the first three months followed by the last three months. In the new edition, in addition to the mares requirements there are estimates for milk production. This estimate, plus the information included in table 16-8 on milk composition, allows for the calculation of nutrient intake by the foal.

These nutrient values can then be compared with the foal's nutrient needs and a supplementation program developed for the foal. With this information there is a starting point to develop creep rations that are based on the nutrient needs of the foal and allow for better supplementation of those nutrients not provided by milk.

For the young growing horses, there have been a number of changes in how requirements are calculated. In the NRC 1989, requirements were calculated based on expected mature body weight, current body weight, expected gain, age and work/training. This was a lot of information needed to calculate requirements. While it did allow for some customization related to daily gain, it was cumbersome. In the new edition, the prediction model is based on age and expected mature size. This has simplified the process but does limit the opportunities to use a specific growth rate for the young horse. You need to use the model's predicted value unless you take the time to calculate the nutrient needs based on a defined growth rate. This does allow you to either use what is available or develop your own nutrient profile. The growth model has been evaluated against real horses and while not an exact fit it does provide in my opinion a good place to start.

The performance horse section has included a fourth category of work load by adding intense work to the light, moderate and heavy categories that were used in NRC 1989. Table 1 shows the type of activity and duration that each category describes. It is important to remember that the examples provided in the NCR 2007 are not inclusive and horse owners will need to determine at what level the horse is truly working at. Too often horse owners tend to over estimate the horse's calorie needs by thinking the horse is working harder or longer than what in reality takes place. This results in horses with too much energy or simply fat horses.

Table 1

Work Load Activities Duration

Light Recreational riding 1-3 hours/week

Start of breaking/training (40% walk, 50% trot,  
Lightly shown horses 10% canter)

Moderate School/lesson horses 3-5 hours/week

Rec riding (30% walk, 55% trot,  
Training 5% skill work)

Frequently shown horses

Polo

Ranch work

Heavy Ranch work 4-5 hours/week

Polo (20% walk, 50% trot,

Show horse heavy schedule 15% canter,

Eventing (low-medium) 15% gallop/skill work)

Race training

Intense Racing 1 hour/week speed work

Elite 3 day event 6-12 hours/week slow work

Endurance horses

## NRC 2007

Nutrient information on different feeds that can be fed to horses is a significant part of this edition. There have been a number of changes in the how the nutrient profiles of the different feeds have been presented. The feed table in the sixth version is different in that it is based on feed data used in the 2001 Dairy NRC. The nutrients included are the same but the feed descriptions have changed. In the 1989 version information on specific feeds was provided.

An example would be timothy hay early maturity could be found. For people feeding timothy hay this was either a reasonable estimate of the nutrients you could expect from such a feed or a comparison with the nutrient analysis you might have on the hay you were going to feed. In the new NRC 2007 the feed table provides information on a broader grouping of feeds. In the forage section you will find listings for cool season grasses of which timothy is one or a cool season legumes of which alfalfa is an example. There are few specific references to the many forages being fed. As a user of this book you may find that the lack in detail is disturbing and for some it is. No longer can we make direct comparisons to determine the nutrient quality of our feeds but we still have very good estimates of what the nutrient value of cool season grass forages might be. I believe the reason for this change is many of the feed testing labs are moving to a broader description of the feed in their reference tables because many of the submissions do not reflect the forage correctly and that adds error to their data bases. In addition to the information on forages there is information on the various concentrate feeds and the mineral supplements that may be used in horse rations.

This new edition has brought together a tremendous amount of information and created an

excellent resource for those involved with feeding horses. While the nutrient requirements of the different classes of horse can be calculated using the NRC 2007, feeding horses still requires consideration of the horse's environment, individual horse's needs, and the horse owner's expectations. The NRC 2007 is a guideline that provides a place to start. Horse owners will still need to adjust feeding programs in order to meet their goals and properly care for their horses.

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