

# **FEEDING AND PREPARING YEARLINGS FOR SALE**

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In the highly competitive horse industry, stud managers and breeders are required to maximise the growth of yearlings so that they are competitive in the sale ring and at the race track. In Australia, the number and high stakes of two-year old races has resulted in increased nutrition and accelerated growth of young horses - in preparation for sale as yearlings to be raced as two year olds.

**The challenge is to produce a yearling which has :-**

- achieved a high percentage of mature height
- good muscle development
- not too much cover
- straight legs with strong bone

There are several opportunities for managers and breeders to guide and protect the growth, body composition and soundness of the yearling ultimately presented for sale.

## **1. Developmental orthopaedic diseases:**

Disturbances of bone growth and development - collectively known as **Developmental Orthopaedic Diseases (DOD)** - cause significant wastage and economic loss and have been attributed to excesses or deficiencies of particular nutrients in the diets. This group of bone anomalies includes bent and twisted legs, wobblers, joint swellings, epiphysitis. They are caused by failure of cartilage to develop into healthy, weight-bearing bone and are common in young thoroughbreds on diets high in protein and energy, to promote rapid growth. Although *nutrient imbalances, biomechanical factors, hormonal levels, conformational defects and environmental conditions* have all been indicted, the two factors most commonly cited as contributing to the onset of DOD are **nutrition** and **biomechanics**.\*

**Overnutrition** is a predisposing cause of DOD and research has shown that young growing horses on diets which provide 130% of recommended **energy** and/or **protein** levels\* may experience **subnormal bone development** - even while depositing fat and gaining weight.

## **2. More Muscle Development or More 'Cover' ?**

There is a tendency for nutrients in unbalanced diets to be used preferentially for fat deposition and the amount of fat deposited is related to the dietary level of the essential amino acid **lysine** relative to the amount of **energy**.

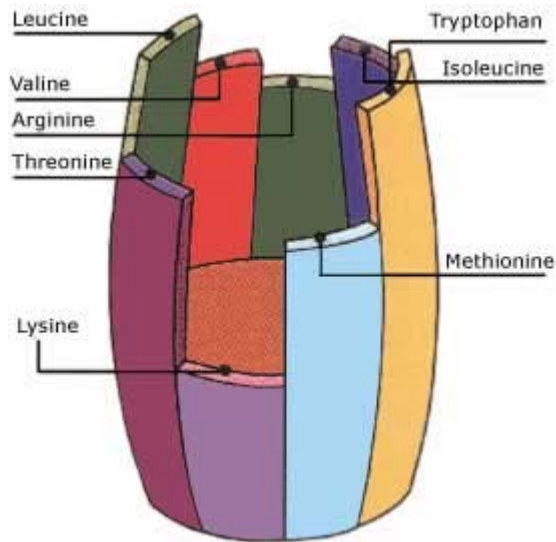
Published research\* has shown that weanlings put on excess fat when the **lysine to energy ratio** is low (0.72), but not when it is high (0.88 to 1.04) - ie they will develop differentially depending on the **quantity** and **quality of dietary protein**.

**Proteins: the building blocks of life - amino acids: the building blocks of proteins:**

Proteins are chains of amino acids. In specifying a dietary protein requirement, we are aiming to meet the amino acid requirements. The quality of the protein in the diet is determined by the number and amount of *amino acids* in that protein.

*Horses can only synthesize half of the 22 amino acids that constitute body proteins.* The 10 that cannot be synthesized are called essential or *limiting amino acids*. Because they cannot be made by the horse, these *essential amino acids* must be provided in the diet and lack of even one will limit protein synthesis and hence growth. Protein building is so specific that even if the diet contains adequate amounts of nine, but only half the required amount of the tenth *essential amino acid*, body protein synthesis will be reduced by 50%.

All 10 *essential amino acids* may potentially be limiting (that is, a deficiency will limit body protein synthesis), but the highest requirement is for those most used in the body - **lysine** and **methionine**. However, if any one of the *essential amino acids* is below the required amounts, the body protein level drops. A useful way to picture this is by using **Liebig's Barrel**.



**Hence if essential amino acids are not at required levels in the diet, growth may be restricted, even though the crude protein level may be correct.**

If **lysine** is limited, a much greater proportion of the protein in the diet will be converted to energy instead of muscle, and will be stored as **fat**. So, even though horses on different diets may gain similar amounts of weight, the gain may be **muscle** or **fat** - depending on the amount of protein and energy in the diet.

It is important to recognise that **excess protein**, or protein that can't be used due to *essential amino acid deficiency*, contributes as much to the energy supplied by the feed as excess carbohydrate does. Rump fat determinations\* have shown that horses with **smaller gains in wither height tended to deposit more fat** and this has been attributed to decreased synthesis of the proteins necessary to build muscle and bone, because of a deficiency of *essential amino acids*. Horses that achieve **greater gains in wither height, while depositing less fat**, will conceivably **reach their mature height earlier in life**.

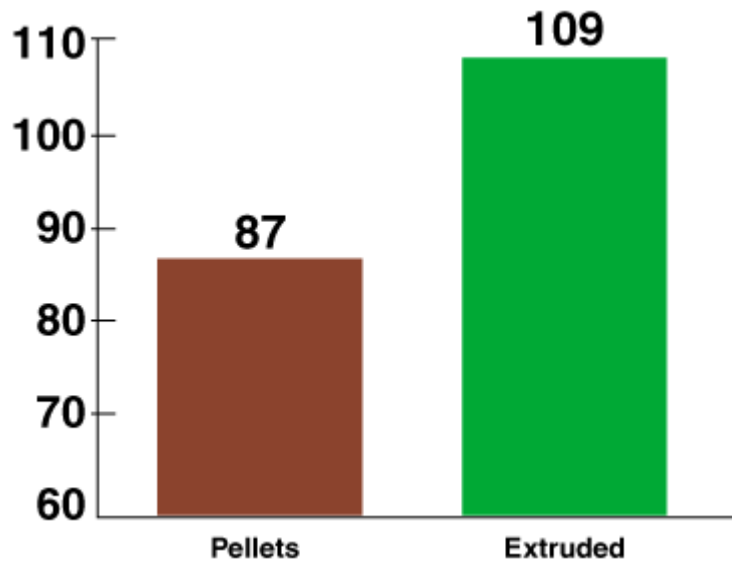
Analysis of diets on studs\* concerned about **inadequate muscle development** has shown **low lysine to energy ratios** - adjusting the protein quality in the feed, to increase the **lysine to energy ratio** corrected the problem. Conversely, when more 'finish' or 'cover' was required, the **lysine to energy ratio** was lowered. Thus, the aim is to meet the amino acid requirements of the yearling, without feeding excess crude protein.

### **3. Gastro-intestinal problems in young group-fed horses:**

When a number of young horses are fed together, there can be competition, such that some of the horses will eat rapidly to ensure they receive their share. Such aggressive feeders are at increased risk of developing gastro-intestinal disorders.

The method used to process feeds has been shown to affect the incidence of digestive system disturbances, such as colic. When pelleted feed is replaced with **extruded** (pressure-cooked, oven roasted) feed, a reduction in the incidence of gastric rupture and other gastro-intestinal problems has been reported\*. This has been attributed to a reduction in the rate of intake. Other studies\* have also demonstrated slower eating with **extruded** feeds.

## Effect of Processing on Time Taken to Consume 4 kg of Concentrate Feed



Another characteristic of **extrusion** processing that is protective of gastro-intestinal function is **increased digestibility in the small intestine**. This has several beneficial effects.

- **It prevents the passage of semi- and undigested starches and proteins to the caecum and large intestine.** Unprocessed oats are only 48% and corn only 30% digested in the small intestine\*. When grains pass from the small intestine to the caecum, they ferment, producing lactic acid and caecal acidosis. Caecal acidosis can increase susceptibility to diarrhoea, colic and founder. Research has shown that **extrusion** cooking shifts the site of digestion back to the small intestine, such that **extruded** feeds are almost completely digested in the small intestine, reducing the risk of caecal acidosis\*.
- **Increased dry matter, energy and protein digestibility** when compared to unprocessed concentrates and sweet feeds.

### 4. Improving weight gain per kilo of feed:

- **Extruded feeds** - Studies\* on an **extruded** versus a pelleted concentrate demonstrated that thoroughbred weanlings fed an **extruded** concentrate, had significantly greater weight gains than those fed a pelleted form. They also showed that the **extruded** feed was consumed more slowly than the pellets, as several other studies have found. This **increased feed efficiency** means that for every 100kg gain in body weight, less weight of **extruded** feeds needs to be fed, compared to pelleted feeds.
- **Oils** have been shown to aid yearling growth rates, without the risks associated with feeding high levels of grains. Within several weeks, the oils also improve hair coat and presentation.
- **Yeast** - particularly chromium yeast improves feed conversion efficiency and aids fibre digestion.

### 5. Exercise:

Exercise has been shown to increase bone strength and cortical thickness and permits the development of a superior athlete. It has also been shown to have a protective effect against DOD\*. Horses have evolved to travel vast distances. Confinement to a stall or yard has been shown to have an osteoporotic effect and periods of restricted exercise should be minimized.

## 6. Supplements:

The following points should be considered before a decision to supplement is made:

- *an analysis of the diet* will reveal whether there is a need for supplementation
- *the ingredients in the supplement* should be stated on the label and the total intake of minerals and vitamins from *the diet + the supplement* must be within **recommended limits**
- *in a group feeding situation* care must be taken to ensure other horses do not get the supplement, or that some don't eat more than recommended levels, eg aggressive feeders
- *the form of minerals and vitamins* should be inert and readily absorbed. Although the efficiency of gastrointestinal absorption adapts to supply for most nutrients, horses cannot absorb minerals that bind with others in the gastrointestinal tract. Minerals supplied as chelates or proteinate are recognized as being more stable and better absorbed.
- *the random, ad hoc inclusion of supplements* and the practice of adding extra '*just to be sure*' ignores the presence of other nutrients and may affect the relative growth of particular tissues. The use of several supplements can lead to **overlap** such that **toxicities** - both clinical and subclinical - may develop. Supplementation or over-supplementation with any single mineral changes nutrient relationships. For example, excess dietary calcium is known to interfere with the utilization of phosphorus, magnesium, zinc and copper - all of which are important minerals in bone and cartilage growth.

## 7. Computer based diet analysis

Feed manufacturers and horse owners place a lot of importance on the nutrient content of feeds and supplements, but it is important to include all the nutrients in the total ration. Thus it is critical that we accurately analyze the whole diet. Traditionally, diets have been based on -

- trial and error
- many myths - both true and untrue, and
- using whatever feeds were locally available

But, there is a lot of technical information available which tells us how the requirements for nutrients varies with age, growth and development and stage of preparation and training, so that it is possible to more **precisely match the nutrients supplied by the feed with the nutrient needs of the individual horse.**

Research strongly and consistently infers the importance of balanced nutrient levels in diets for growing thoroughbreds. Correct nutrition of yearlings is essential for their productivity and longevity as racehorses. Mitavite has been able to take the guess work out of ration formulation and remove many of the unknowns, by analyzing the ingredients used in **Mitavite** feeds, by regular analysis of the formulated feeds to ensure that nutrient levels remain within the stated analysis and by providing a computer-based diet analysis service.

For further information on feeding horses please fill in our **nutrition advice form.**

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**References Bruin, G (1993)** Effect of exercise on the incidence of osteochondrosis in young horses *Proc 13th Symp ENPS*; **Schoenherr, W. D. et al (1996)** Effect of extrusion cooking on apparent digestibility of a grain concentrate compared with a commercial sweet feed in horses. *Proc AAEP 42:328*; **Garbers, GV and Blanco, JC (1987)** Preventative Management of Epiphysitis in Young Growing Thoroughbreds *Proc 10th Symp ENPS*; **Hintz, H. F. et al (1985)** Extruded feeds for horses *Proc 9th Symp ENPS*; **Meyer, H et al (1993)** Investigations on preileal digestion of oats, corn and barley starch in relation to grain processing *Proc 13th Symp ENPS*; **Thomas, M. L. et al (1991)** Influence of copper supplementation and pelleted vs extruded concentrate on growth and development of weanling horses *Proc 12th Symp ENPS*; **Biffin, R (1991)** Stud nutrition-nutrient relationships *In: Equine Nutrition Proc 181 Post Grad Found Vet Sci*; **Pool, R. R. (1987)** Developmental orthopaedic disease in the horse. *Proc 33rd AAEP :143-149*; **Nutrient Requirements of Horses (1989)** National Research Council, National Academy Press, Washington DC; **Householder,**