

## **SUMMARY**

### **Use of Hemp Oil and Hemp Ingredients in Equine Diets**

by

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#### **Introduction**

Horses have an intestinal system designed to process large quantities of low energy, high-fibre forage ingested on an almost continuous basis to meet their nutrient demands.

This system has remained largely unmodified by nature.

Man has selectively bred horses to perform a wide range of high performance roles, like:

- Racing
- Show-Jumping
- Eventing
- Endurance Racing
- Polo
- Dressage
- Carriage Driving
- Trotting and Pacing

These activities place great physical and metabolic demands on the animal.

Equine athletes have high nutrient requirements. Their energy requirements are far greater than that provided by the high bulk, low-energy forage diets for which their alimentary canal was designed.

This has resulted in:

- More energy-dense feedstuffs in the diet achieved with high levels of cereal grains and their by- products.
- Energy intakes regulated through adjusting the forage to grain ratio.

Unfortunately, this type of grain supplementation overshadows the significant contribution that the forage portion of the diet should make to satisfying the horse's nutrient demands.

Feeding practices are frequently far removed from the way in which the horse evolved to eat, with large single meals of cereal grains offered 2-3 times daily.

This feeding strategy has serious health implications, since the feeding of high levels of cereal grains, containing large amounts of starch, is known to elicit the onset of various maladies such as gastric ulceration, hind-gut acidosis, laminitis and colic (Garner et al. 1977; Carroll et al. 1987; Clarke et al. 1990; Rowe et al. 1994).

These debilitating conditions frequently lead to poor performance and in many cases result in irreparable damage and the subsequent destruction of the animal.

## **Use of Oil and Other Ingredients in Equine Diets**

Dietary fats are required to facilitate absorption of fat-soluble vitamins A, D, E and K, and as a source of the essential fatty acids (EFAs), Omega 3 and Omega 6, which are not synthesised by the body.

Together, n-6 and n-3 fatty acids play a crucial role in brain function as well as normal growth and development.

Deficiencies in n-3 and n-6 FAs can lead to:

- Reduced growth
- Dermatitis
- Infertility
- Compromised Immunity
- Reduced Wound Healing

The balance of Omega 3 to Omega 6 in the diet is important. There is a complex interaction between these EFAs including a competition for enzymes controlling the metabolic pathways between these two groups of fats.

Too much of one fatty acid can stop the formation of the other fatty acid. Too much Omega 6 inhibits the formation of Omega 3.

Horses fed high levels of Corn or Soya Oil can be supplied with excess amounts of Omega 6. Too much Omega 6 leads to:

- Negative Cardiovascular effects
- Inflammatory effects

Correct levels of Omega 3 lead to:

- Beneficial Cardiovascular effects
- Anti-inflammatory effects
- Beneficial Neurological effects
- Beneficial Reproductive effects

Metabolic utilization of absorbed fat is highly efficient in horses.

Fats can be used to:

- Increase Energy
- Substitute for starchy cereal grains

Digested Oils provide 2.25 times more utilizable energy than an equal weight of digested carbohydrate or protein.

Using oils in the diet reduce need for high levels of cereal grains, which are detrimental to gut health and for example, are ideal for pregnant mares in late gestation with reduced appetite but increased energy requirement.

Benefits of feeding oils in place of cereals are:

- Improved energy efficiency
- Improved performance
- Enhanced Body Condition
- Less excitable behavior
- Improved health

In horses, feeding levels of oils recommended up to 15% of total ration (DM Basis) without any effect on fibre digestibility.

## **Benefits of Feeding Oils**

### **Performance:**

- Improved power to weight ratio (reduction in DM intake and ballast)
- Decreased metabolic heat production
- Enhanced stamina as a result of muscle glycogen sparing
- Improved sprint performance due to increased energy transduction from anaerobic glycolysis.
- Mitigation of Acidaemia during intense exercise

### **Behaviour:**

- Reduced anxiety and aggression (reduction on crib-biting, windsucking, weaving)
- Lower stress levels in foals

### **Lactation, Reproductive performance and Growth:**

- Increases milk fat content at days 10 & 60 of lactation without affecting protein and total solids.

### **Health (with Omega 3 rich oil):**

- Decrease in inflammatory conditions
- Reduced indicators of Pulmonary inflammation
- Lower heart rate in exercising horses (delaying onset of fatigue)
- Positive effects on fertility and foetal development
- Improved seminal characteristics in stallions

## **Benefits of Hemp Oil in Equine Nutrition**

Hempseed oil is cold pressed from seed at temperatures below 38°C and unlike commonly used oils in equine nutrition is not chemically refined or treated in any way.

Compared to oils commonly used in horse diets hemp oil contains:

- The highest level of polyunsaturated fats.
- One of the Lowest levels of Saturated fats
- Optimal ratio of Omega 3 to Omega 6 at 3:1
- A rich source of Omega 3 and Omega 6
- High amounts of  $\gamma$ -linolenic acid and stearidonic acid, the biologic metabolites of LA and ALA, respectively, **which none of the other commonly utilised vegetable oils in horse diets contain.** Therefore, due to metabolic competition between the two EFAs for access to the  $\Delta$ -6 desaturase to convert LA and ALA to  $\gamma$ -linolenic acid (GLA) and stearidonic acid (SDA), respectively, the presence of both GLA and SDA in hempseed oil allows this enzymatic step with  $\Delta$ -6-desaturase to be efficiently by-passed.

**Table 2:** Fatty acid composition of plant seed oils utilised in horse diets and Hempseed oil

	Saturated	MUFA	PUFA	Linoleic	ALA	GLA	Stearadonic	n-6	n-3	n-6:n-3
<b><u>Vegetable oils</u></b>										
Coconut oil	86.5	6.0	4.5	1.5	0.0	0.0	0.0	1.5	0.1	15.0
Corn oil	14.5	29.9	51.3	50.4	0.9	0.0	0.0	50.4	0.9	56.0
Linseed oil	9.4	20.2	66.0	12.7	53.3	0.0	0.0	12.7	53.3	0.2
Peanut oil	20.0	44.0	31.0	31.0	0.1	0.0	0.0	31.0	0.1	310.0
Rapeseed oil	6.6	59.2	29.3	19.7	9.6	0.0	0.0	19.7	9.6	2.1
Safflower oil	9.7	11.9	74.0	73.9	0.1	0.0	0.0	73.9	0.1	739.0
Soya oil	15.6	21.2	58.8	51.5	7.3	0.0	0.0	51.5	7.3	7.1
Sunflower oil	12.0	20.5	63.3	63.2	0.1	0.0	0.0	63.2	0.1	632.0
Hempseed oil*	7.3	10.6	76.0	53.8	17.2	3.3	1.6	57.1	18.8	3.0

Source: Composition of Feeds TSO, US Food Tables

\* Analysis of hemp seed oil conducted at King's College London on Good Oil

Hemp Oil provides added value in horse diets because it is:

- Highly palatable
- Very efficient source of dietary energy
- Contains unique forms of Omega 3 and Omega 6 in the most efficient form to metabolise of any plant oil without the toxins and dioxins of fish oils.
- Delivers correct ration of Omega 3 and Omega 6 without causing imbalance
- Completely traceable

## **Benefits of Hemp Seed Meals in Equine Nutrition**

Hemp seed meal ingredients contain high levels of Omega Oils, Protein and Fibre. They are proven to be highly palatable for horses and contain:

- Excellent digestible fibre
- Excellent "complete" protein
- Free from enzyme inhibitors.
- GM Free
- Free from Heating
- Free from phytoestrogens