



How to build muscle in horses

Dr David Marlin

science
SUPPLEMENTS
The Equine Nutrition Specialists

How do you build muscle in a horse?



You cannot build muscle without exercise!



You cannot build muscle without regular exercise!



Mon	Tue	Wed	Thu	Fri	Sat	Sun
					X	X

NO!

Mon	Tue	Wed	Thu	Fri	Sat	Sun
X	X		X		X	

YES!

You cannot build muscle without the right intensity of exercise



NO!



YES!

**You cannot build muscle without the
right nutrition**



**You cannot build muscle without the
right nutrition**
positive energy balance



**To build muscle a horse must be getting more energy
from feed than it is using each day**

You cannot build muscle without the right nutrition - *protein*



**To build muscle a horse must be
getting sufficient protein**

You cannot build muscle without the right nutrition - *protein*



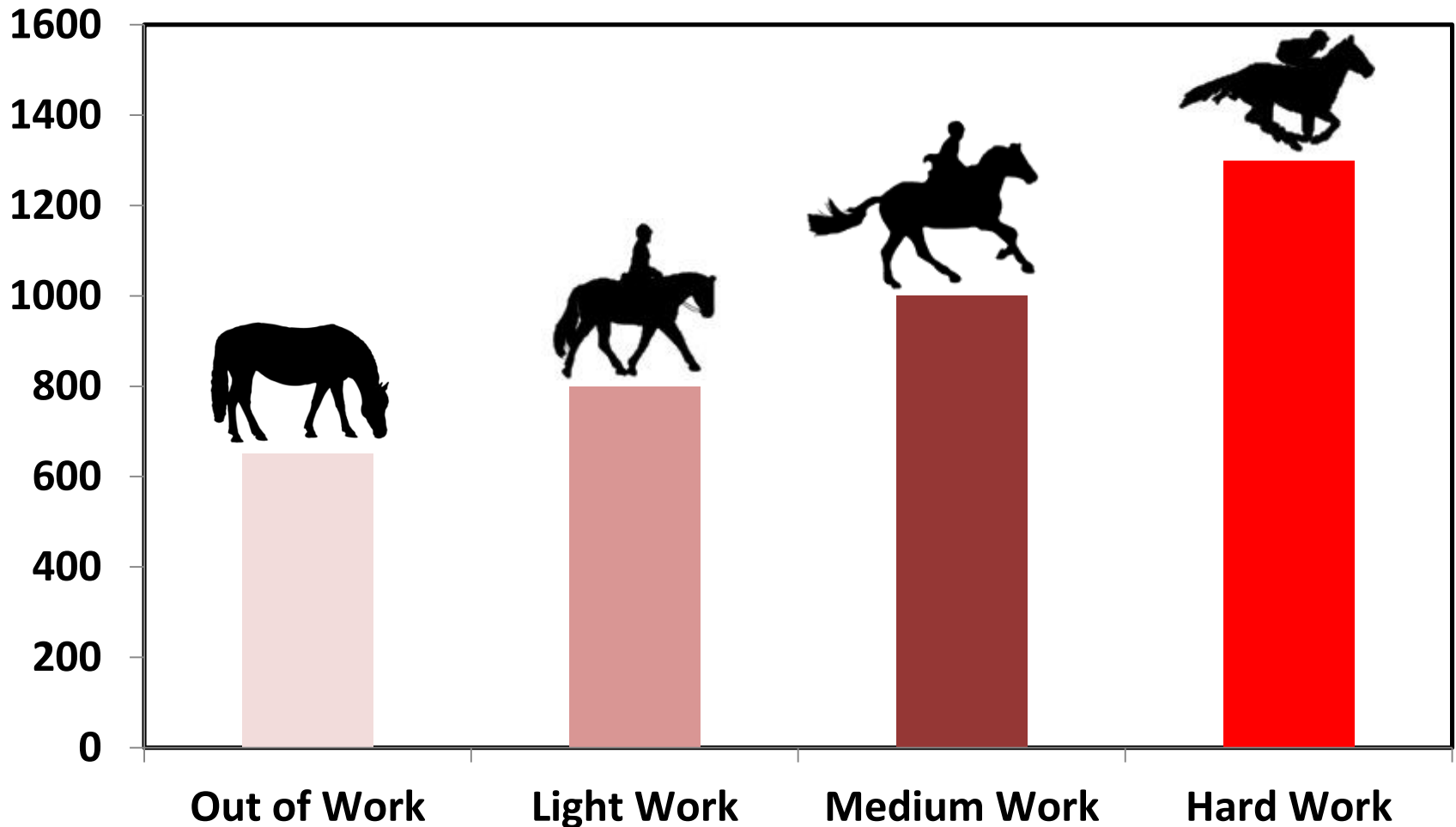
To build muscle a horse must be getting sufficient protein

**You cannot build muscle without the right
nutrition - *protein***



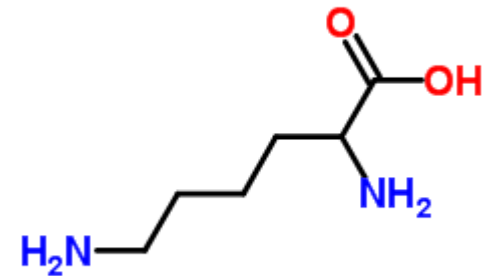
**1.3 g of crude protein per kg
650g per day for a 500kg horse NOT IN WORK**

Grams of protein per day for a 500kg horses



You cannot build muscle without the right nutrition - *Lysine*

To build muscle a horse must be getting sufficient protein quality



Protein quality is judged on the amino acid LYSINE
LYSINE is an essential amino acid - must come from the diet

You cannot build muscle without the right nutrition - *Lysine*

Protein quality is based on LYSINE which should be around 0.65%



**1300g crude protein per day
~9g Lysine per day**

You cannot build muscle without the right nutrition - *Lysine*



You cannot increase muscle by feeding more LYSINE than the minimum daily amount

9g or 90g has the same effect!

What about Muscle Building Supplements?

- High lysine?



- Creatine?



- Gamma oryzanol?



- Spirulina?



What about Muscle Building Supplements?

- High lysine?



NO!

- Creatine?



- Gamma oryzanol?



- Spirulina?



What about Muscle Building Supplements? **CREATINE**

Creatine *DOES WORK* in human athletes and has
been proven effective in many studies



What about Muscle Building Supplements? **CREATINE**

Creatine *MUST* be good because there are so many creatine supplements for horses!



Table 6. Average values of hemoglobin, total leukocyte and fibrinogen in exercising horses in three trials.

Data	Control (n = 20)		Creatine 40 g	
	Control (n = 20)	Experimental (n = 20)	Control (n = 20)	Microhematocrit
Hemoglobin (%)	20.648	20.884	21.584	21.344
White blood cell (10 ⁹ /l)	8.184	9.048	8.848	8.848
Fibrinogen (mg/dl)	216.88	200.88	200.88	220.88
Hemoglobin (%)	21.584	21.684	21.584	21.584
White blood cell (10 ⁹ /l)	8.184	8.848	8.848	8.848
Fibrinogen (mg/dl)	200.88	200.88	200.88	200.88
Hemoglobin (%)	21.584	21.584	21.584	21.584
White blood cell (10 ⁹ /l)	8.184	8.848	8.848	8.848
Fibrinogen (mg/dl)	200.88	200.88	200.88	200.88

Mean ± SD. Values in the same row with different superscripts are significantly different (P < 0.05).
 *Significant difference between the two experimental groups (P < 0.05).
 †Significant difference between the control and experimental groups (P < 0.05).
 ‡Significant difference between the control and experimental groups (P < 0.05).

What about Muscle Building Supplements? **CREATINE**



Table 6. Average values of hematocrit, total leukocyte and fibrinogen in exercising horses in three trials.

Item	Experimental diets		
	Control	Creater 20 g	Creater 40 g
Hematocrit (%)	28.8AA	30.8AA	31.2AA
WBC (x10 ⁹ /L)	8.8AA	9.4AA	9.4AA
Fibrinogen (mg/dL)	21.6AA	40.6AA	39.6AA
Hematocrit (%)	31.6AB	31.6AB	30.6BC
WBC (x10 ⁹ /L)	8.8AA	9.4AA	8.8AA
Fibrinogen (mg/dL)	20.6AA	24.6AA	30.6AA
Hematocrit (%)	31.6BC	31.6AB	31.6AB
WBC (x10 ⁹ /L)	8.8AA	9.4AA	9.4AA
Fibrinogen (mg/dL)	20.6AA	24.6AA	30.6AA

Mean ± SEM. Different letters indicate significant differences (P < 0.05) by Tukey's test. AA, AB, BC are different letters for each parameter (P < 0.05) by ANOVA. Values are the values obtained for each parameter (mean ± SEM) for the three trials. Reference value: Hematocrit: 30-45%, WBC: 6-15 x10⁹/L, Fibrinogen: 100-400 mg/dL.

Feeding **CREATINE** to horses has **NO EFFECT**

Horses **DO NOT ABSORB CREATINE**

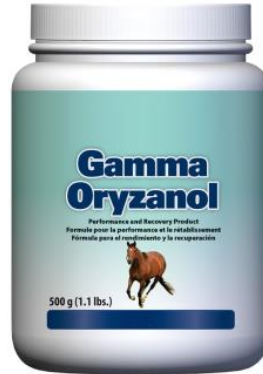
If you feed **CREATINE** to horses you are **WASTING MONEY**

What about Muscle Building Supplements? **CREATINE**



- Sewell,D. and Harris,R.C. (1995) Effect of creatine supplementation in the Thoroughbred horse. Equine Vet J Supp. 32, 239-242.
- Schuback, K., Essén-Gustavsson and Persson,S.G. (2000) Effect of creatine supplementation on muscle metabolic response to a maximal treadmill exercise test in Standardbred horses. Equine Vet J. Nov;32(6):533-40.
- D'Angelis, F.H., Ferraz, G.C., Bolelil, C., Lacerda-Neto, J.C. And Queiroz-Neto, A. (2005) Aerobic training, but not creatine supplementation, alters the gluteus medius muscle. J Anim Sci. Mar 83(3), 579-585.

What about Muscle Building Supplements? γ -Oryzanol

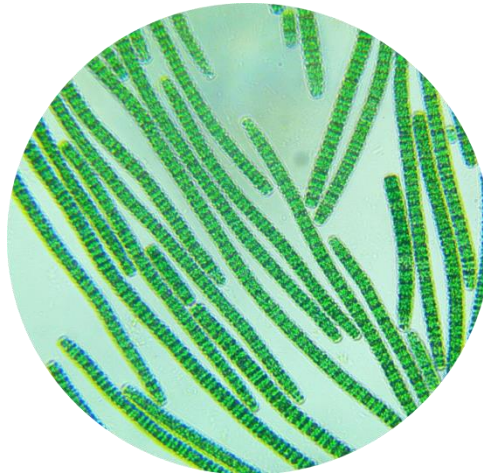


- **Gamma oryzanol is marketed as a “natural steroid”**
- **At one stage it was listed by the FEI as a prohibited substance**
- **There are currently only two studies in human subjects and neither found any effect of feeding γ -oryzanol on muscle mass**
- **One study in horses found that feeding 2g gamma γ -oryzanol per day for 31 days did not change blood testosterone levels**
- **No studies have shown any evidence of enhanced muscle growth**

What about Muscle Building Supplements? **Spirulina**



On the beach

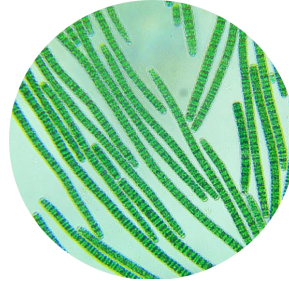


Magnified



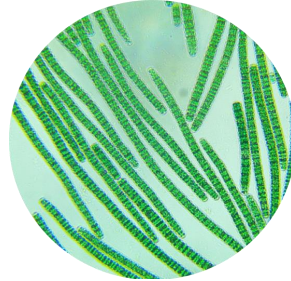
Dried

What about Muscle Building Supplements? **Spirulina**



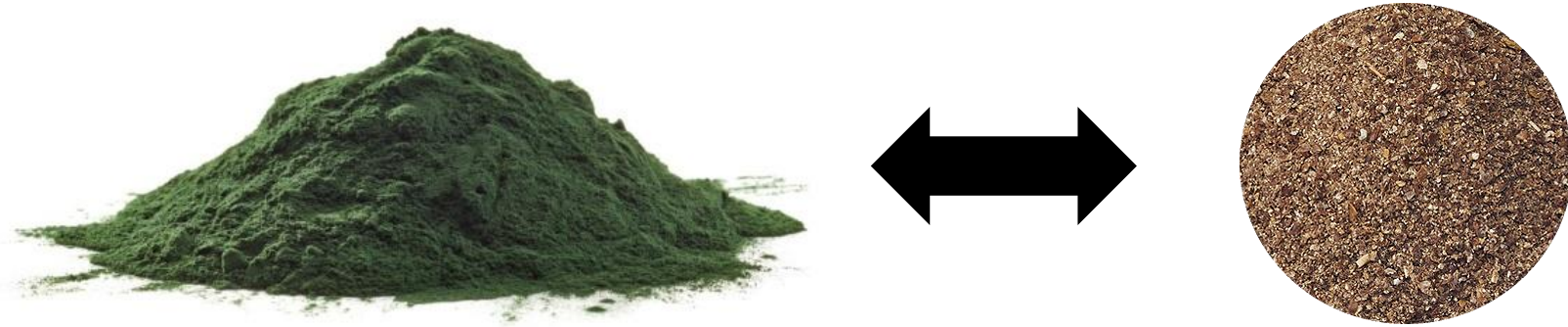
- **Blue-green algae**
- **High proportion of protein (around 2/3rds)**
- **Suggested to be a good source of B vitamins**
- **High in iron**

What about Muscle Building Supplements? **Spirulina**



- **Can contain microcystins, toxic metals and harmful bacteria**
- **Contaminated blue-green algae can cause liver damage, stomach pain, nausea, vomiting, weakness, thirst, rapid heartbeat, shock, and death**

What about Muscle Building Supplements? **Spirulina**



There is nothing “magic” or “special” about the protein and amino acids in Spirulina. It is the same as in oats, soya, linseed, etc

What about Muscle Building Supplements? **Spirulina**



“You may have been told that blue-green algae are an excellent source of protein. But, in reality, blue-green algae is no better than meat or milk as a protein source and costs about 30 times as much per gram”



U.S. National Library of Medicine
National Institutes of Health

What about Muscle Building Supplements? **Spirulina**

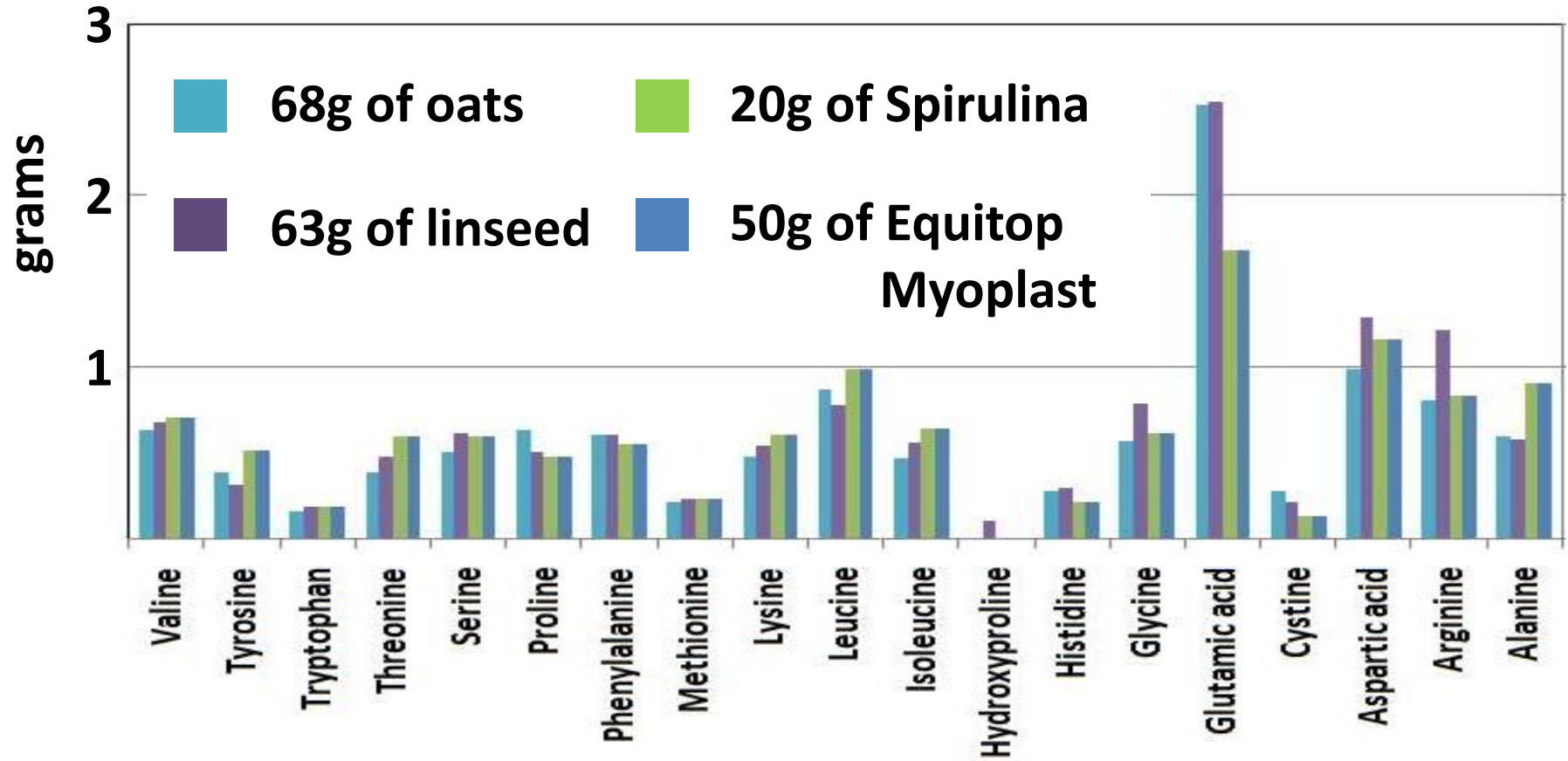


“You may have been told that blue-green algae are an excellent source of protein. But, in reality, blue-green algae is no better than meat or milk as a protein source and costs about 30 times as much per gram”



U.S. National Library of Medicine
National Institutes of Health

What about Muscle Building Supplements? **Spirulina**



What about Muscle Building Supplements?

- High lysine?



NO!

- Creatine?



NO!

- Gamma oryzanol?



NO!

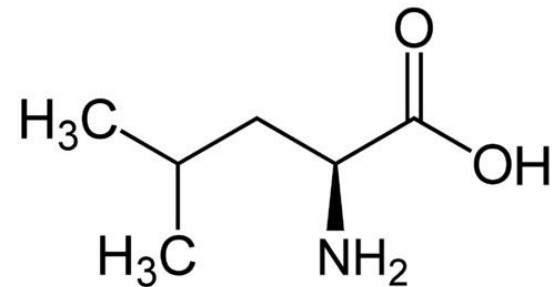
- Spirulina?



NO!

What can you use?

- In human medicine and sport the amino acid **LEUCINE*** and its metabolite **HMB** have been shown to
 - stimulate muscle protein synthesis
 - aid in recovery processes from exercise
 - aid glycogen replacement
 - delay the onset of fatigue
 - maintain mental function

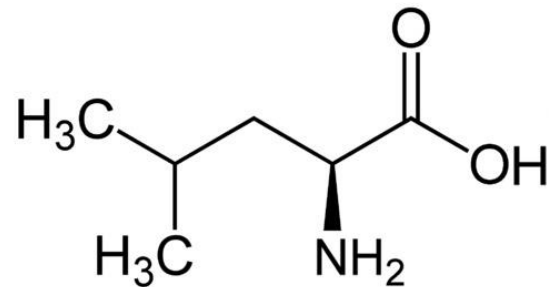


Leucine

*Campbell, B et al. (2007) International Society of Sports Nutrition position stand: protein and exercise. *J.Int.Soc.SportsNutr.* 4, 1-8.

What can you use?

- IF your horse is in regular work
- IF your horse is working hard enough
- IF your horse is getting sufficient protein
- IF your horse is getting sufficient lysine
- IF your horse is in a positive energy balance



Leucine



What can you use?

In horses, feeding 10-15 g/day HMB for 6-32 weeks has been shown to:

- improve endurance
- reduce muscle damage
- aid maintenance of bodyweight
- increase red blood cell number
- Increase win rate (in racing)



Nissen, S. et al. (1997). β -hydroxy β -methylbutyrate (HMB) supplementation in training horses. *Metabolic Technologies Bulletin*, Ames, Iowa.

Miller, P. and Fuller, J.C. (1998). The effects of supplemental β -hydroxy- β -methylbutyrate (HMB) on training and racing Thoroughbreds. Abstract from the 17th Annual Meeting AESM, Leesburg, VA, p.13.

Ostaszewski, P. et al. (2012) Effects of β -Hydroxy- β -Methylbutyrate and γ -Oryzanol on Blood Biochemical Markers in Exercising Thoroughbred Race Horses. *J. Equine Vet. Sci.*32(9), 542-551.

SUMMARY

NO

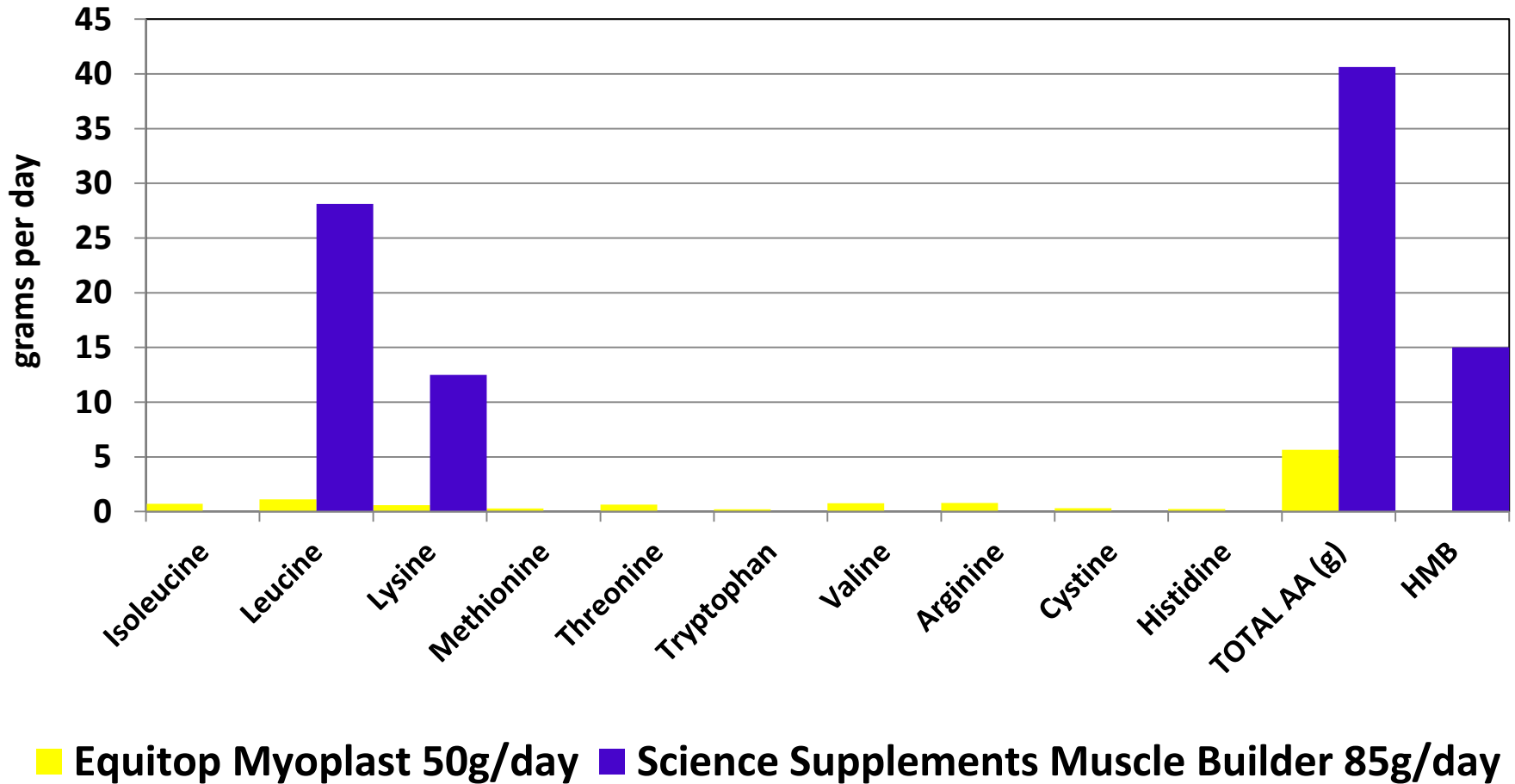
- High lysine
- Creatine
- Gamma oryzanol
- Spirulina
- Equitop Myoplast

YES

- Regular work
- Hard enough work
- Sufficient protein
- Sufficient lysine
- Positive energy balance
- 20-30g LYSINE
- 15g HMB

Muscle Builder

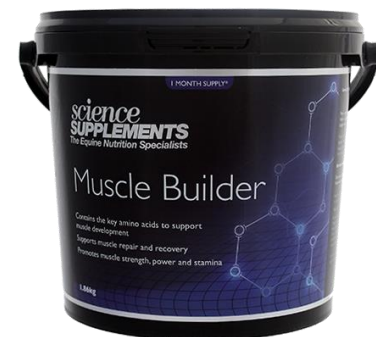




Muscle Builder

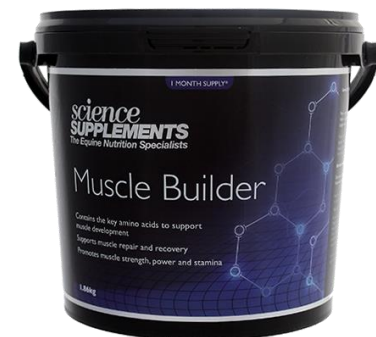
Composition

- Per daily dose (150ml = 6 x 25ml scoops) 62g provides
 - Leucine 22.5g
 - HMB 15g
 - Lysine 10g
 - Carbohydrate 14g



Muscle Builder

- Contains the key amino acids to support muscle development > Leucine, HMB & Lysine
- Supports muscle repair and recovery after exercise
- Promotes muscle strength, power and stamina
- 8x more amino acids than Equitop Myoplast
- 1.86kg tub gives approximately 1 month supply



[http://davidmarlin.co.uk/portfolio/
the-science-of-equine-muscle-
building-supplements/](http://davidmarlin.co.uk/portfolio/the-science-of-equine-muscle-building-supplements/)

Article on Muscle Building by David Marlin

science
SUPPLEMENTS
The Equine Nutrition Specialists