Fodder Fact or Fiction

By Lark Burnham, PhD

Drought and limited forage availability have helped promote a novel method of forage production: hydroponics. In this system, wheat or barley seeds are sprouted in trays and repeatedly rinsed with water. The resulting seedlings are fed, with originating seeds intact, to livestock.

Hydroponics, or plant propagation without soil, has been around for many years. Systems used specifically for forage production vary from simple and cheap (seeds sprouted in plastic trays purchased at the dollar store) to extensive and expensive (trays on stacked shelf units with automatic watering). Whatever the method, all employ the same basic principles:

- Seeds are repeatedly rinsed with water to promote growth and prevent drying, but not so wet as to encourage mold growth
- Light, either natural or artificial, is optional
- No growing media or additional vitamins or minerals are added.

Forage evaluation

The term 'dry matter' (DM) is used by nutritionists to denote the non-water content of a given feedstuff. Water must be taken out of the equation before any meaningful comparison can be made. This is done by multiplying a given quantity of grain or forage (fresh or cured) by percent DM (as a decimal). Feed and seed must be dried to a DM of about 90% or higher to prevent mold growth. Below is the DM comparison of barley grain and the resulting grass, according to globalfodder.com:

- Barley seed (regular) 90% DM (10% water) - 100 lb. of barley grain contains 90 lb. DM (non-water material)
- Barley grass at 7 days - 17% DM (83% water) - 100 lb. of barley grass contains 17 lb. DM (non-water material)

Various websites that sell seeds, trays, shelf units, and/or plans make claims such as the following:

From:
www.globalfodder.com/wp-content/uploads/2012/03/Untitled.png

- *Increases protein content:* Total protein remains the same, before and after sprouting, it is simply broken down and reassembled in a different location. However, proportion of protein compared to other nutrients may change. Although an increase in protein from 10% (grain) to 16% (fodder) is credible, the increase reported for Global Fodder grain (from 16% to almost 30%) seems unlikely (M. L. Galyean, Ph.D., Texas Tech University, personal communication) compared to regular grain
- 10 lb. regular barley grain contains 0.9 lb. CP (9 lb DM x 0.10)
- 100 lb. fresh fodder contains 2.72 lb. CP (17 lb. DM x 0.16)

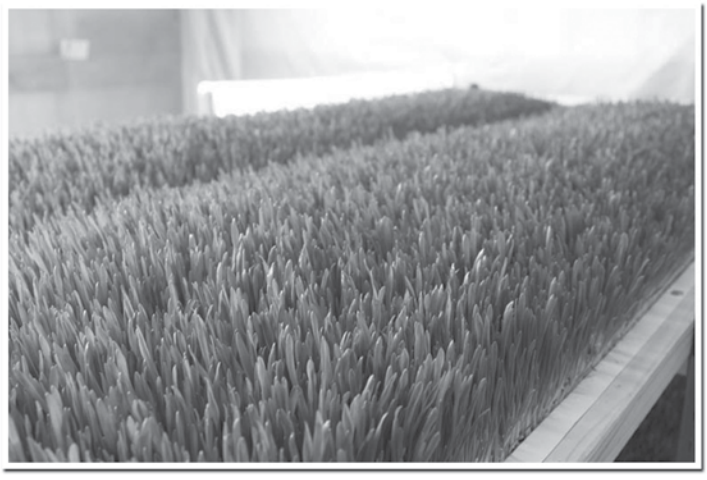
From foddersolutions.com and foddersolutions.org

- *Greater energy and vitality*

Some energy stored in the seed is consumed during the sprouting process; the plant is harvested before it can be replaced by photosynthesis. There is also a decrease in DM during this process (Shewmaker, 2014). Vitality is a subjective term that has no actual nutritional value.

- *Save on feed prices*
- *Low water consumption*
- *Low energy consumption*

More elaborate hydroponic systems use automatic watering, artificial lighting, and climate control for all-season production, all of which require additional energy. Human time and energy input is significant in both non- and automated systems. The cost of water should also be considered, especially in drought-stricken areas. Real life cost analysis of feedstuffs should include labor and water required to produce a given quantity of DM.



The following table compares the cost/lb. of crude protein (CP) for several feedstuffs.

A comparison of crude protein (CP) costs given feed costs and dry matter (DM) concentrations (Shewmaker, 2014)

Ingredient	$/ton	% DM	%CP	DM	$/lb. CP
Alfalfa hay, 1st bloom	$185	90	16.0	10.28	$0.642
Corn	$202	90	8.0	11.22	$1.403
Corn silage	$45	32	8.0	7.10	$0.887
Barley	$200	90	13.2	11.11	$0.842
Barley seedlings	$50	10	14.7	25.00	$1.701
Barley hay	$120	90	9.0	6.67	$0.741

Hype aside, barley and wheat grass have value for small farms, especially those without access to pasture. Barley and wheat grass are highly palatable and can be used to entice recovering animals to start eating. They also make a tasty addition to the animal diet, but should never be the sole source of forage, or be used to replace either protein/energy or vitamin/mineral supplements. Feed good quality hay (green and leafy) when possible.

Do the math and decide if all the work and water is really cheaper than good hay, even if it has to be imported from another state. Take the water out of the equation and compare the actual nutrient quantities in forages that are available.

Literature cited

Shewmaker, Glenn. 2014. Hydroponic forage system: Too good to be true? Progressive Cattleman, Jan. 2014. http://www.progressivecattle.com/focus-topics/nutrition/6025-hydroponic-forage-system-too-good-to-be-true)

Photos by Barbara Coleman.

About the author:

Lark Burnham received a B.S. in Animal Science (1979), from Kansas State University and a M.S. in non-ruminant nutrition (1995) from Kansas State Universtity, Manhattan, and a Ph.D. Doctorate in ruminant nutrition (2004) from Texas Tech University, Lubbock. Her special interests are comparative nutrition, the role of the micro flora in all mammals, fiber digestion, and probiotics. Lark currently works for Natur's Way. Inc., Horton, KS, which produces MSE probiotics.