

# Drought BUSTER

## Hydroponic Fodder Production

By S. Hurley



*Australia is a land that unfortunately is all too frequently ravaged by bushfires, floods and droughts. With them they bring a whole range of hardships, both within farming families and to various farming enterprises, they also bring out a lot of ingenuity within the farming sector.*

*It was during a drought that struck the mid North Coast of N.S.W. that deer farmer Peter Ryan turned to hydroponics to produce his own green fodder to sustain his valuable stock.*

Hydroponics is not new, but fodder production is an area in which soilless cultivation is expanding rapidly. Cereal grasses and other green crops can be grown very rapidly, within a week to ten days, in specially designed units, to heights of up to 20 - 30 centimetres. This is then fed direct to farm livestock.

Provided that temperature and light needs are adequate, regular output of such forage is possible all year around, whatever local weather conditions may be.

Fodder production units can fall into two classes: those made by farmers to their own specifications, following certain general principles; and those turned out by manufacturers of agricultural and hydroponic apparatus. A grass and green forage growing unit must however provide optimum conditions for the rapid development of seed material into edible herbage within the space of a week to ten days. This means that not only do the nutrition and environmental conditions within the installation have to be right, but that the technical design, mechanics of operation and management must be first class. It was with these principles in mind that Peter Ryan and

engineer Gary Brown developed "The Fodder Factory".

The Fodder Factory started as a vision or dream of what could be done to control the environment for our "feed needs". Originally, the concept of the Fodder Factory came about to provide fodder during the traditional winter shortage but its development was expedited in 1989 when Peter was forced to buy in \$13,000 worth of feed to keep his stock alive.

For Peter, floods and drought threatened many years of intense deer farming, for Gary, the drought had reduced the value of his cattle to \$50 a head, and a mini-cyclone that struck the district completely destroyed his hydroponic tomato farm and home. Without the development of the Fodder Factory, both were facing certain ruin.

A prototype was subsequently built on Peter's 200 hectare property near Taree which enabled them to keep their stock alive and healthy during the drought that turned their district into a dust bowl. A lot of development work has since been carried out on the unit and the question of how (economically) to control and maintain a constant temperature, when the out-

side environment varies from zero degrees to forty-five degrees has since been solved. How to germinate and grow it to its maximum yield in only eight days has also been solved.

The Fodder Factory developed by Peter and Gary operates independently of the outside environment to produce nutritious green stock feed 24 hours per day, 365 days a year, rain, hail or shine. It does not matter if it is too wet or too dry, too hot or too cold.

Their system operates on a staggered planting regime, producing stock feed on a daily basis. Total labour requirement is only about one hour per day, which consists of harvesting fodder from the unit and introducing new seed, and although the unit is a run-to-waste system with about 8% loss of nutrient-rich water the nutrients only need replenishing once per month. The entire operation is extremely simple and was designed by Peter and Gary so that unskilled labour could be employed for the operation of the factory allowing skilled personnel to be free to use existing machinery etc.

A fodder production unit basically consists of a series of production trays or

benches to which nutrient solution is supplied by irrigation or sprays continuously. A protective covering is used, in order to ensure that temperatures within the unit are maintained between 20 -30 degrees Celsius, with satisfactory humidity, ventilation, and aeration. With the development of the Fodder Factory this has culminated in a galvanised steel structure which is covered inside and out in two separate woven plastic covers. These are seam sewn and literally fit like a glove to enclose the steel frame. The covers are separated above head height with a polystyrene barrier that is 99% air (as light as a feather) but provides the same thermal barrier as 1200mm(4ft) of solid concrete.

Inside this insulated envelope gas heating and evaporative cooling are used which are the most efficient methods of heating and cooling. The air is drawn across galvanised steel shelves holding plastic trays of grain and fodder in varying stages of germination and growth. Above these trays are micro-misters to deliver just the right amount of water and nutrients.

The Fodder Factory developed by Peter and Gary is run or controlled by a "brain" or micro-processor which has been pur-

posely built to run on 10 AMP. 250 Volt power and provides all functions of the Factory except ofcourse the placing of grain in the trays and the fodder being fed out.

All components are Australian made and specifically designed, built and manufactured in Australia to provide the perfect environment and necessary nutrients to grow green edible feed (using the least energy) in the least period of time.

What the Fodder Factory does is grow green edible feed anywhere, anytime, and nearly any type of water can be used, for example, bore water that may be too saline or contaminated with minerals can be used for this purpose because of the very short growing cycle. A lot of bore water can not be used for crops or livestock because the contaminates build up over a long period of time and can reach toxic levels - this does not happen in the Fodder Factory.

### Fodder Nutrition

During development of the Fodder Factory, several types of grain were trialled, including barley, sorghum and corn, with mixed results. For deer farming Peter found that, sorghum proved 'adead loss', while barley 'showed promise'.

Oats however proved to be a very cost-effective grain, requiring reasonably cool conditions and relatively low light levels.

Oats ranked as the highest in protein and rivalled wheat as the most nutritious of the grains. The protein level of feed oats rises from 6% to 13.9% after 8 days in the Fodder Factory and for every kilogram of oat grain 7 kg of edible fodder is produced with twice the protein and at least twice the energy level plus with far more vitamins and minerals.

Current Fodder Factory models yield from 240 to 960 kg (depending on unit size) of nutritious green feed per day for less than \$40 per tonne. According to Peter, 70 - 100 cows or 200 plus red deer can be fed with the 12 bay 720 growing tray model. The plants reach a height of 25-30 cm and are fed, roots and all, to the livestock.

The single biggest cost factor, excluding capital investment in the

Fodder Factory, is the oat seeds, but according to Peter and Gary this type of fodder production system will well and truly pay for itself many times over.

Hydroponic fodder is nutritious and palatable. Independent research trials overseas have found it to substantially increase milk yields in dairy cows, as well as improving the vigour and performance of racehorses and brood mares. Each kilogram of fodder was equated nutritionally to 3kg of lucerne. It was found that hydroponic fodder systems produced animal feed at about one half the cost of that produced conventionally - this was based upon the larger amounts of fuel needed in the production and transportation of traditional animal feeds. Costs of insecticides, fertilizers, machinery for cultivation and harvesting and the labour of field grown feeds were also estimated to be at least 10 times greater than that of hydroponically grown fodder.

Fodder production units enable livestock producers to grow feed year round in situ. The requirements for large storage facilities for hay or silage are therefore reduced as fresh grass is produced daily. Under this system, fodder can be grown in a very small area compared to field-grown grasses and feeds, and it is not influenced by what 'mother nature' dishes up.

In our dry and drought-stricken regions, where there is little or no grazing fodder for livestock, fodder production has much to commend it not only to produce much needed green fodder but also to help in the recovery of drought-stricken paddocks. Kikuyu and other suitable but expensive grasses can be sprouted and grown in the fodder shed then ploughed into prepared paddock where they can quickly take hold for a much faster recovery.

Hydroponic fodder production is an economical alternative to buying in feed, and as a fodder production system it will see farmers through drought, deluge and winter shortages.

In times of adversity, many innovative and life-saving ideas have come to fruition. The Fodder Factory is one such idea which was designed and developed through necessity. It is an Australian innovation designed for simple operation which requires no knowledge of hydroponics or electronics and is certainly worth looking at as a long term drought-management option. ■

More information on The Fodder Factory can be obtained by writing to:  
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*After 8 days fodder reaches 20-25cm and is then fed out to stock.*