



## Lemna – Primary Market Segments

### 1. Protein-rich Food (Water Lentils)

- ✓ High in protein
- ✓ High in vitamins
- ✓ High in calcium

### 2. Protein-rich Feed

- ✓ High in protein
- ✓ High in starch
- ✓ High in vitamins
- ✓ High in calcium

## Cultivars



### *Lemna*

*High in protein*

*Cheap to grow*

*Easy to harvest*

*Reduces water evaporation*

*Grows on wastewater incl. chicken manure, aquaculture effluent, palm oil effluent*

## Cost of Production

- \$0.50 - \$0.70 per kg dry weight (unprocessed)
- Less with reduced labour costs

## Productivity

- 10 – 15 g dry weight per m<sup>2</sup> per day
- 30 - 45 T per hectare per year (equiv. 15 000 kg crude protein)

## Lemna Nutrient Attributes

30-40% Protein

20-30% starch

2-3% Carotenoids

Antioxidants

Vitamins

Minerals (Ca, Mg, Fe)

Chlorophyll





## Growth Requirements

- Neutral pH is ideal, growth is impaired below 5.5 or above 10
- Ammonia concentrations above approximately 1400 mmol/L inhibit growth, and becomes toxic above 9300 mmol/L
- Full water surface coverage is required to prevent competition between duckweed and algae and limit pH change
- Chicken manure is unlikely to provide adequate concentrations of all essential micronutrients and therefore duckweed should be provided with a micronutrient supplement

## Benefits of Organic Duckweed

- Utilisation of waste to produce a valuable product
- Nutrient recycling, particularly phosphorus
- Reduce feed costs

### Example: *Lemna gibba* Composition

Component	% of Dry Matter
Dry Matter	3.5
Crude Protein	41.7
Crude Fat	4.4
Acid detergent fibre	15.6
Non-fibre carbohydrate	17.6
Ash	16.2



## Amino Acid Profile

Amino Acid	g/ 100 g <i>Lemna gibba</i>	Amino Acid	g/ 100 g <i>Lemna gibba</i>
Taurine	0.03	Methionine	0.64
Aspartic Acid	3.51	Isoleucine	1.66
<b>Threonine</b>	1.68	Leucine	2.89
Serine	1.39	<b>Tyrosine</b>	1.27
Glutamic Acid	3.67	<b>Phenylalanine</b>	1.75
Proline	1.42	Histidine	0.73
Glycine	1.93	Ornithine	0.05
Alanine	2.30	<b>Lysine</b>	1.85
Cysteine	0.44	<b>Arginine</b>	2.14
<b>Valine</b>	2.12	<b>Tryptophan</b>	0.40