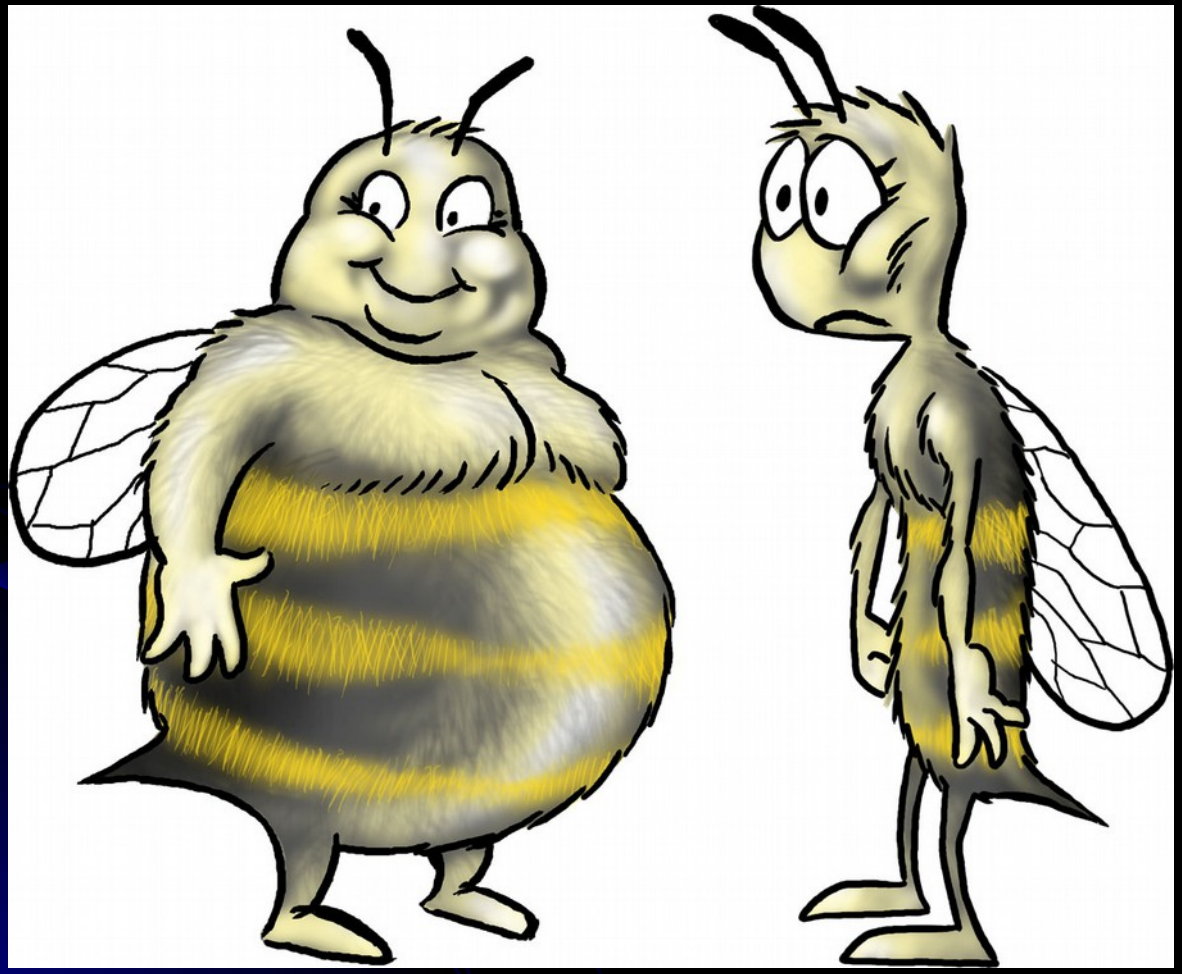
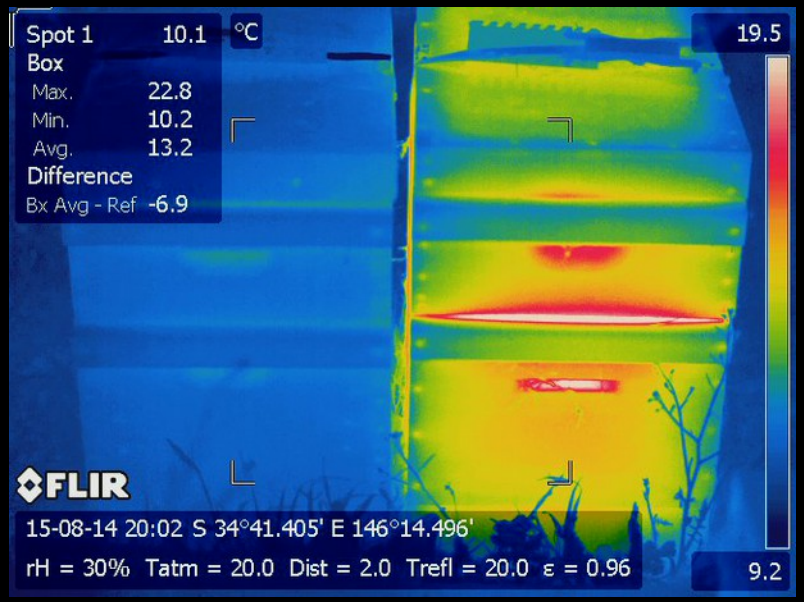
FAT BEES – SKINNY BEES

An overview of honey bee nutrition



- **Doug Somerville**
  Australia


NO ENTRY


Spot 1 10.1 °C
Box
Max. 22.8
Min. 10.2
Avg. 13.2
Difference
Bx Avg - Ref -6.9
19.5
9.2
FLIR
15-08-14 20:02 S 34°41.405' E 146°14.496'
rH = 30% Tatm = 20.0 Dist = 2.0 Trefl = 20.0 ε = 0.96

HONEY BEE NUTRITION

One of 3 essential elements of successful beekeeping

1. Queens
1. Pest and diseases
1. Nutrition management

(all equal 1st)

Honey bee nutrition management practices in Australia

Essence of the problem:

- **Lack of nectar - drought**
  - winter
- **Lack of pollen- quantity**
  - quality

Pollen quantity

- **25 - 55 kilograms per annum**
- **3 or more pollens being collected at one time (but not always!)**
- **Protein, amino acids, fat, vitamins and minerals**
- **What do we know ????**

Pollen quality (what we do know)

Protein varies 7% to 35%+

- **Less than 20% considered poor**
- **20% to 25% considered OK**
- **Greater than 25% considered good**
- **30% excellent**

Pollen quality

Amino Acids 10 essential

1. **Isoleucine**
2. **Valine**
3. **Methionine**
4. **Threonine, Leucine, Phenylalanine**
   Histidine, Lysine, Arginine, Tryptophan

Expressed as a % of the protein

Back to protein

- **Brood area**
- **Drone numbers**
- **Longevity (high protein bees live longer)**
- **3kg of pollen at 20% CP**

=

2kg of pollen at 30% CP

The nectar factor

- **Area of brood initially influenced by number of nurse bees and sugar/nectar stimulus**
- **Sustained by pollen availability (possible to die from over stimulation)**

Bottom line

- **The total available amount of PROTEIN will influence longevity of worker bees, drone brood production, disease tolerance and ultimately the productivity of the colony.**

Fats in pollen

- **Pollen lipid content 0.8 to 18.9%**
- **73 different fatty acids identified (n=577)**
- **5 common fats to all samples:**

Palmitic	
Stearic	
Oleic	**2%+ reduces longevity**
Linoleic	**6%+ reduces longevity**
Linolenic	

Vitamins

- **Not much known**
- **Essential to all animals (gland development)**
- **B complex essential to insects (pollen a good source)**
- **Many vitamins unstable**

Minerals

- **Again, very little known**
- **Potassium, phosphate and magnesium required by insects**
- **Sodium, sodium chloride and calcium toxic to bees**
- **Found in pollen: potassium, magnesium, calcium, sodium, iron, copper, manganese, zinc, aluminium, cadmium, chromium, lead, nickel and selenium (most as trace)**

In summary

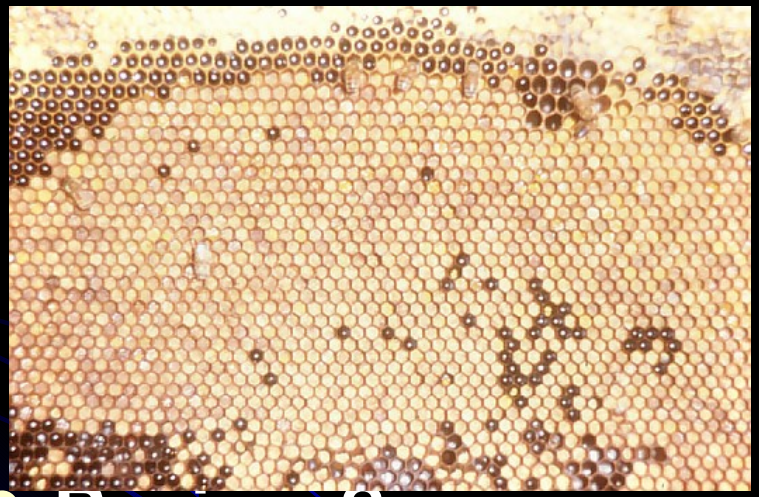
- **Protein mid 20s plus**
- **Volume may make up for poor quality**
- **More than one source of pollen**
- **Know very little about fat, mineral and vitamin requirements**
- **Some fats, minerals could be toxic when added to diet – artificial supplements??**

Supplementation

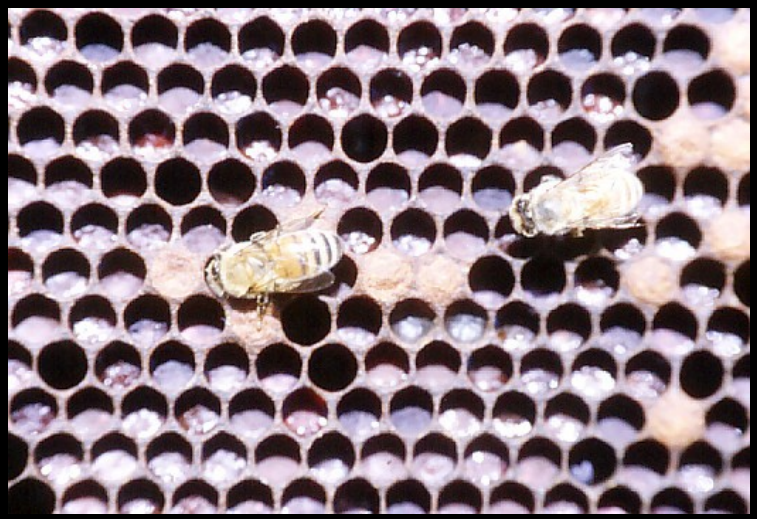
- When to feed?
- Too little/too late common
- How to feed, free-flying or in-hive?
- Freshness, vitamins, protein and fats deteriorate
- Cost effectiveness !!!!

Supplementation

- **Consumption does not equal benefit!**



- **Recipes?**



Feel GOOD!

- **Are you feeding your bees because it makes you feel good?**
- **Leave some hives in each yard and measure the benefit, unless you make far to much $$ out of bees and you want to feel good?**
- **Most people probably won't go to the trouble**

Research areas

- **Map your main pollen sources**
- **Determine their protein value**
- **Cage work for remaining fatty acids, minerals and vitamins**
- **Historically heaps of work done on testing latest recipe without basic understanding of the nutritional requirements of bees!**

Australian Government
Rural Industries Research and Development Corporation

FAT BEES SKINNY BEES

A manual on honey bee nutrition for beekeepers

A Report for the Rural Industries Research and Development Corporation

by Doug Somerville

RIRDC Publication Number 05/054
RIRDC Project Number DAN-186A

The SUGAR story

Carbs (energy)

- **Nectar = sucrose**
- **Sucrose collected by bees converted to fructose and glucose**
- **Bees recognise sugar concentrations less than 5% in nectar**
- **Ripen to honey (moisture 13-18%)**
- **20°C cluster temp**
- **34-35°C brood temp**

Why feed sugar ?

- **Starvation**
- **Stimulate breeding and thus increase pollen collection**
- **Retain consistent drone breeding**
- **Well-fed queen cells**
- **Hygienic behaviour**

Types of sugar

- **White ***** (most similar to nectar)**
- **Honey - HMF (acid)**
  - robbing
  - aggressive
  - bee disease
  - $$$
  - sugar more attractive than honey
  - adults live longer
- **Organic sugar, raw sugar, molasses, brown sugar, waste sugar (salt, starch)**

Management

- **Queen rearing**
- **Drought / Wintering**
- **Enhance pollination**
- **Increase adult population prior to honey flow**

Quantities

- **1:1 sugar/water = stimulation lasts 3 days after ripening**

  - 1 to 2 litres per hive
- **2:1 sugar/water = stores (reduces stimulation)**

  - 10 litres plus per hive

Feeders

- **Bottom board**
- **Front**
- **Top**
- **In-hive**

Feeders cont.

- **Out side (bulk)**
- **Dry**

Worry about

- Yeast
- Ants
- Drowning bees
- Too little too late
- Nosema

Sugar feeding – an under utilised management tool in Australia

UK, Canada, USA, NZ, China