FAT BEES – SKINNY BEES
An overview of honey bee nutrition

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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 too 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!
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A manual on honey bee nutrition for beekeepers

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by Doug Somerville
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