New Perspectives for the UK Cider Industry: Where next for Orchards and the Cider Supply Chain?

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• Summary
Heineken UK

- UK’s largest brewer & cider maker
- Part of Heineken NV, 3rd largest global brewer
- Employees ~2,500 people in the UK
Heineken UK

Caledonian Brewery, Edinburgh

Royal Brewery, Manchester

Bulmers Cider, Hereford

John Smiths, Tadcaster

UK Head Office, Edinburgh
1. Share of EU Production Volume 2008

- UK, 61.9%
- Ireland, 10.8%
- France, 6.8%
- Spain, 5.9%
- Germany, 3.9%
- Finland, 3.7%
- Sweden, 3.3%
- Belgium, 3.1%
- ³Lithuania, 0.4%
- ²Denmark, 0.1%

²Denmark – 2007; ³Lithuania – 2006

Source: AICV members’ reports, HMRC Releases

2. Share of UK Servings*
   12 months to September 2010

- Beer, 38.4%
- Spirits, 26.9%
- Wine, 25.5%
- Cider & Perry, 7.9%
- Coolers & RTDs, 1.3%

*Portman Group serving sizes:
Beer, Coolers & Cider ½ pt (284ml), Wine 125ml, Spirits 25ml

Source: AICV members’ reports, HMRC Releases
NACM Members Orcharding Investment

Change in mid-year UK planted area – 3 year moving average

Sources: DEFRA with NACM estimates for 2010
The Cider Industry’s use of UK apples of all types

– 2 year Moving Averages

NACM use of cider fruit

NACM use of cull fruit

All other UK Apples

Source: DEFRA and NACM members’ reports
Orchards and Sustainable Apples
Mature orchard – March, before leaf break
Mature orchard – May, in blossom
Mature orchard – October, ready for harvest
Vision

• “secure a **sustainable** supply of raw materials, in the right quality and quantity, at acceptable costs, in a way **resilient** against a number of **external drivers**”
Impacts?

- Physical
- Political
- Legislative
- Societal
- Etc...
10 Drivers

- Agricultural Innovation
- Legislative environment
- Political/Economic stability
- Population increase
- Climate change – water
- Climate change – temperature
- Water scarcity
- Peak oil/oil price high
- Customer/Retailer
- Society at large

Cider Apples
### Emerging Issues for UK Cider Apples

| Legislative environment | • Around 75% of the variable cost of an orchard is spraying for scab  
| | • CPP restrictions are getting tighter  
| | • The precautionary principle and high R&D costs will apply to new products  
| | • Increasing oil price will drive up costs of both fertilisers and CPPs |
| Climate change – temperature | • Unavoidable climate change will impact aspects of tree growth,  
| | • warmer winters mean no dormancy period for trees, leads to fewer buds  
| | • start-stop springs lead to sporadic blooming and poor fruit set  
| | • new pest & diseases emerging |
| Peak oil/oil price high | • Cider apples get approx. 30 tractor passes per year  
| | • Major cost factor as oil price increases  
| | • Significant CO2 emissions |
Long Term Orchard Research

• The Challenge (facing agriculture)
• The Research Landscape
The Challenge

Globally, food production and agriculture has a dilemma, and the views are polarising.

**TECHNOLOGY DRIVEN**
- Inherently interventionist
- Chemistry
- Agro-chemicals
- Intensive
- Oil dependency
- GM is the solution
- Efficient maximum yield now is the driver
- Linear

**ECOLOGY DRIVEN**
- Inherently complimentary
- Biology
- Natural systems
- Extensive
- Less oil dependent
- GM may have a role
- Future sufficient yield is the driver
- Cyclical

The solution is, of course, both!
Long Term Research Landscape

- **Understanding**
  - Physical and biological context
    - Orchard ecosystem
    - Environmental chemistry
    - Varietal development
    - Disease microbiology
  - Sustainable value creation
    - Orchard design
    - Agroforestry
    - Best practice
    - Continuous improvement

Heineken UK
**DRIVERS**
- Pesticides
- Price and 91/414/EEC & next generation
- Energy/Oil
- Climate Change
- “CR”

**Outcomes**
- Reduced scab
- Increase output
- Maximise value
- Improved SD indicators
- Security of supply

**Research Map**

**Sustainably Grown Apples**

**Orchard System Interventions**
- Intervention Modes
  - partitioning: spatial, temporal synthesis
  - modulation
- Intercropping
  - animals (chickens, sheep)
  - plants
  - for cash crop
  - for disease prevention
- Yield v. potency
  - % water v. sugars, tannins etc.
  - **tbc**

**Indicators & Measures**
- In development
- Require ‘gravitas’
- Broad tree crop basis
- Demonstrate outcomes
- HUK & HGSC funded
- Temp Tree Crop network

**Climate Change**
- Impacts of extreme weather
- Water logging
- Storm damage
- Drought
- Dormancy
- Bee populations
- Underway, sponsored by DEFRA
- Links to UKCIP

**GIS Database**
- Layers to cover distribution, scab, rainfall, soil type etc.

**Ecosystem Service**
- Carbon sequestration
- Water retention
- Untilled farmland
- Same as deciduous woods?
- Can it be farm income?
- Social impact value (HOCE work)
- **Potentially funded by NERC**

**Disease (focus on SCAB)**
- Epidemiology
- ‘Inherent’ natural level & role
- Economic impact
- Treatment
- Life cycle, other agents
- Benign treatments (GRAS)
- Genetic marking (resistance)
- Detailed ‘symbiosis’ with apple histological interaction with apple tissue pathology
- **tbc**

**Soil Science**
- Nutrient storage, transport and cycling within orchards
- Use of the sward: composition, water retention
- Mycorrhizal developments
- **tbc**

**Ecology/Biology**
- How to apple trees grow ‘natively’
- What is their role as deciduous fruit trees
- What is their overstorey, understorey?
- Insects, mammals, birds, microfauna, non-flowering plants?
- Metrics/Statistics
- Size of apple
- Prevalence of disease
- Size of tree
- Yield
- What is a healthy tree and health index
- What’s been lost from the genome?
- Selection criteria for breeding
- Biodiversity
- Field visit to Kyrgyzstan
- **Potentially funded by NERC and Darwin Fund**

**Short Term (pragmatic)**
- Garlic wash
- Chickens
- Sheep
- Pruning techniques
- Sedum ‘herbicide’ strip
- Clover rich sward
- Leaves/mow/compost
- Mulch
- Tuned N application
- Sweep harvesting
- pilot ‘MASSA’ indicators
- Underway, sponsored by HUK

**Outcomes**
- Reduced scab
- Increase output
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Short Term

• The need to change practice is understood by growers, who are entrepreneurs in their own right
• To gain momentum with growers we need to improve grower income/security as well as broader sustainability
• We need to accept and share the risks as well as the benefits
• Intention: a number of short term (< 3 years) trials which are mainly related to orchard management

• Outcome
  – Engagement
  – Improved sustainability
2010 fact finding & preliminary work

- Use of garlic wash as tree tonic to better help tree fight disease
- Comparative nitrogen trials: what is the best amount of nitrogen and to what extent can this be reduced by use of nitrifying bacterial sprays
- Calcium transport: can tree health and fruit quality be improved
- Pollination: does the sward make a difference to pollinating insects and ‘fruit set’ rate
- Collection, shredding and composting of leaves to reduce over-wintering scab spores
- Understand what role sheep could play, and what constraints would need to be overcome
How will we know we are sustainable?

• We know we have to define “sustainable”
• We know we need to measure to manage
• We know we need measures that are simple and cheap to use
• We know we need externally verifiable, robust, outcome based indicators
• We know we need to start ...
Measurement and Indicators

Indicators

Translating changes in practice into standard indicators

Practical measurements

More sustainable

Not sustainable

Changes in Practice
(More) Sustainable Orcharding

1. Farmer and local community
   - Land Use Efficiency
   - Diversity of Value Generation
   - Retention of Money
   - Farm Income
   - Income Variability

2. Social and cultural wellbeing
   - Animal Welfare
   - Health & Safety
   - Training
   - Happiness Index

3. Natural resource use
   - Soil Fertility
   - Additional Water use
   - Non-Renewable Energy use

4. Biological Resources
   - Biodiversity
   - Orchard health via bio-indicators
   - Naturalness index
   - Bee diversity/population

5. Environmental pollution
   - Water at Risk
   - Greenhouse Gases
   - Chemicals Applied
   - Use of “waste”
There's no such thing as waste ... only undiscovered by-product
What is “Waste”?

• “unwanted matter or material of any type, often that which is left after useful substances or parts have been removed”

Definition: Cambridge Dictionary
What is “zero waste”

• Not a literal term, more a shift in thinking ...from ‘man’ to ‘nature’

  Nature does not waste anything

  Nature recycles everything

  Nature ‘clusters’ by ecosystems
Waste Hierarchy

- Avoid
- Reduce
- Reuse
- Recycle
- Energy Recovery
- Disposal
Types of Waste

- Avoid
- Reduce
- Reuse
- Recycle
- Recover components
- Downcycle
- Energy Recovery
- Disposal

- Avoidable Waste
- Systemic Waste
- Wasted Waste
- Undefined
Types of Waste

- Avoid
- Reduce
- Reuse
- Recycle
- Recover components
- Downcycle
- Energy Recovery
- Disposal

Avoidable Waste
Systemic Waste
Wasted Waste = Unused Resource
Undefined
Cider Making to Bio Refining

Bio Refinery
fermentation, extraction, refining

Apples

water

energy

sludge

gas

water

alcohol

tannin

pectin

poly-phenols

cellulose

hemi-cellulose

alcohol

Spirulina

food

fuel alcohol

? cosmetics/pharma

energy

cider

shoes

jam
There is no such thing as waste!
To achieve any of the above we also actually have to start!!
“we’ve always done it that way”
Results in Inertia

... and so the need to overcome it
Problems cannot be solved at the same level of awareness that created them.

Einstein
Summary

• The world is changing fast and there is a pressing need to find more sustainable orchard management systems

• There is much we can and should learn from nature, including efficient use of all our crop’s resources

• A combination of research, trials and monitoring will get us there

• Change is always difficult, but necessary and rewarding
Oh, and we still make great beer too!