Biorefineries

Are tanneries about to change?

CONFIDENTIAL

Anna – a thought exercise



An apple farmer who is making a reasonable profit per kg of apples

Who wants to increase her profit

She decides to sell skinned, cubed, and packaged apple

Anna – value add



The skin is a long string of material that goes in the bin

The apple core is placed in the bin

Anna feels a duty to minimise her waste – so engages an environmentalist who says that all waste should be used

Said environmentalist finds a market for the skin (pectin) for jams and a compost manufacturer who will take her cores

Anna – the apple farmer

Is Anna helping the planet?

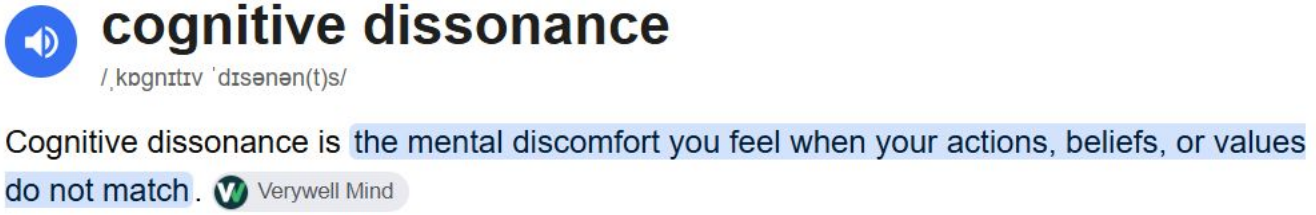
Is Anna maximising her business opportunity?

Is Anna no longer an apple farmer?

Is Anna a pectin manufacturer?

Leathe
r

Why is there no cognitive dissonance between the environmental and economic merits for Anna but there is none such recognition for the leather industry?

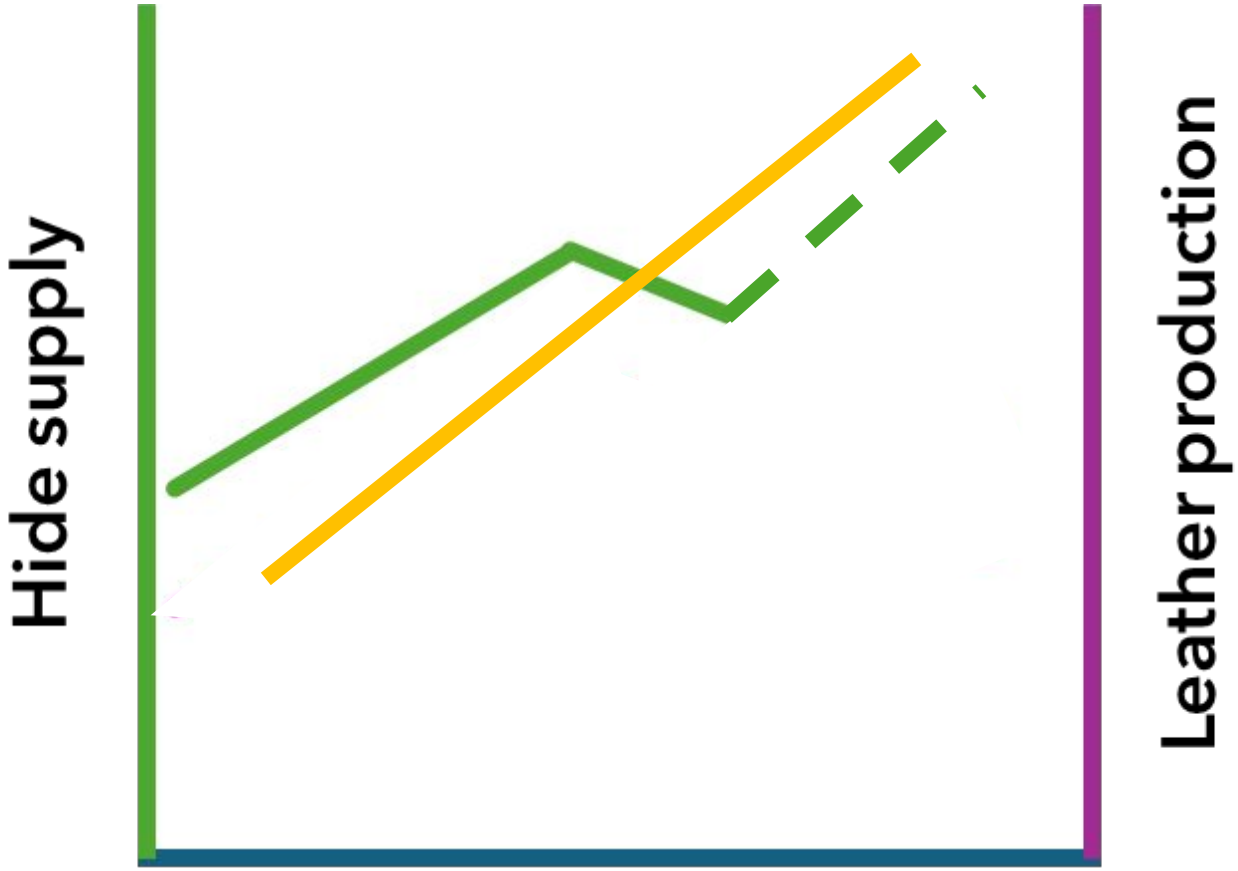


Hide/skin supply



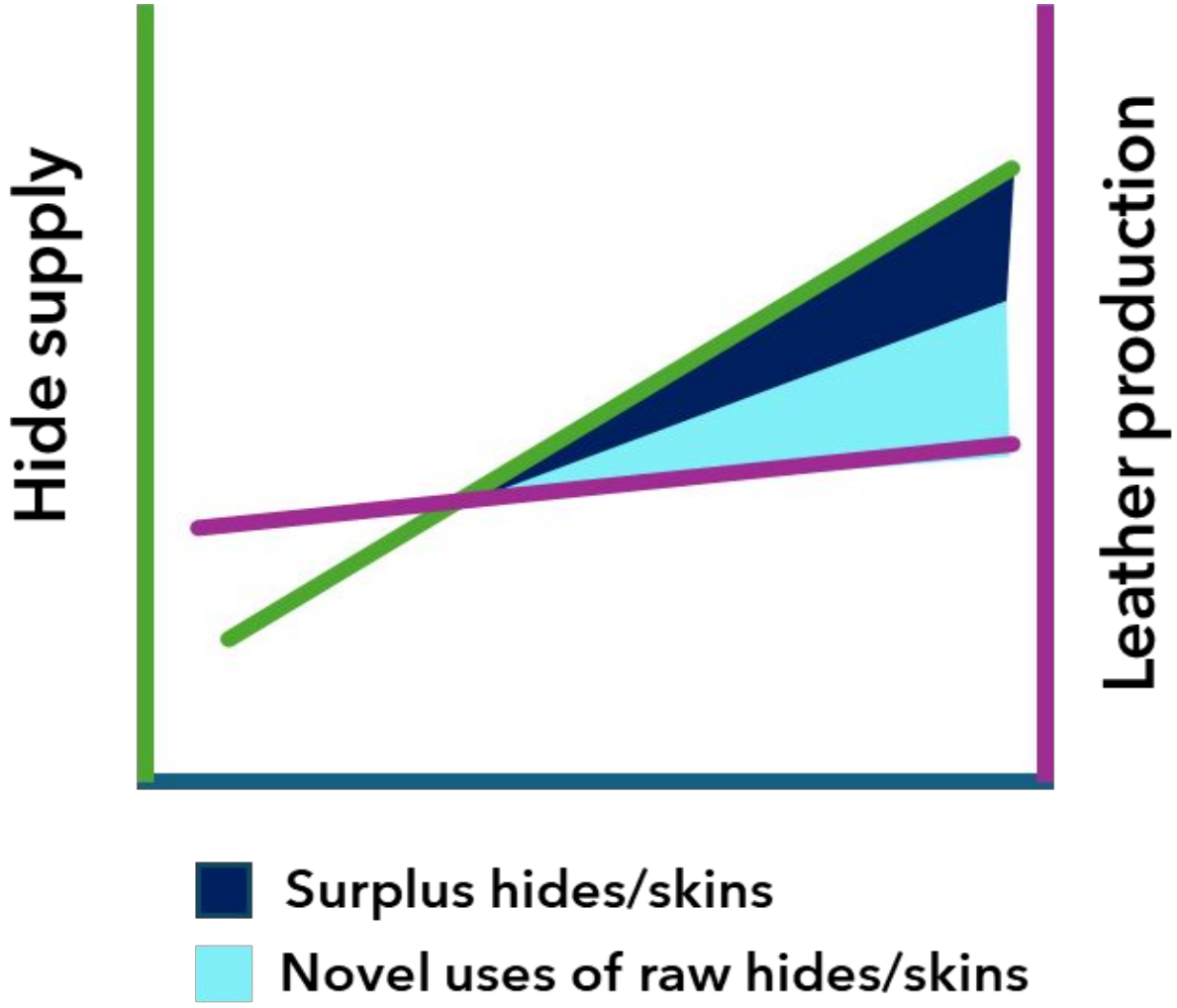
Non – determining co-product (by-product)

Global leather production



Determining co-product

Novel collagen – or efficiency?



Hide composition

- Collagen (grain and corium) and flesh connective tissue
- Keratin (epidermis and hair)
- Dermatan sulfate
- Albumen
- Hyaluronic acid
- Elastin
- Decorin
- Chondroitin sulfate A
- Chondroitin sulfate C
  - Melanin
  - Triglycerides (oleic, palmitic, stearic)
  - Phospholipids

UNIDO mass balance

- The 1999 UNIDO mass balance showed tanners sell 26% of raw material
- 74% is not sold (putting ¾ of starting materials into bin)
- 40% of wet-salted hide is water (65% in rawhide) - 20% salt
- 452 kg chemicals – 380 kg wasted

The EU CBE JU

- The aim of the Circular Bioeconomy Joint Undertaking:
  - The primary aim of the Circular Bio-based Europe Joint Undertaking (CBE JU) is to advance a competitive bioeconomy for a sustainable future by accelerating innovation and market deployment of circular bio-based solutions
- To see a decreased dependence on fossil fuels and to see biomass, especially waste, as valuable input into industry
- The rise of biorefineries to replace petrochemical refineries

Tanneries and biorefineries

- Leather is the main product of tanneries
- Tannery by-products must become valuable and the focus of biorefineries that sit within or alongside tanneries
- By-products or end-of-life leathers must not be seen as someone else's problems
- Look at each waste and determine when the best time to remove them is

By-product harvesting

- Hair out of effluent vs. hair from hair-shaving or hair-save
- Glycosaminoglycans from effluent
- Sulfide containing hair/flesh vs green
- Trimmings from tanning agent free hides = food (animals or humans) – rounding (10% more cutting)
- Render is more than tallow
- Keratin (UV protection)
- Chemical optimisation and recovery (and chemical making)
- Waste chemicals used in leather-making (e.g., REEL technology)
- Recycled water lowers carbon and lowers water use

Biorefineries and industry 5.0

- Industry 5.0 is an emerging industrial phase that reunites human creativity and critical thinking with the speed and precision of advanced technology and AI-powered robots
- Will create two tiers of tanneries/biorefineries:
  - Low income (mass production, low compliance/conformance) – high risk ESG and human dependent (training intensive)
  - High income (highly automated/AI dependent facilities) – 24/7, 365 days production, engineering and IT intensive. Value added biorefinery activities

Dream
?



2026 LHCA Annual meeting



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Brand Panel



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David Wright

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