Milking it - challenges and opportunities in dairy sustainability

Dr. Jude L. Capper

Promar International Conference, Crewe, Cheshire
November 21st 2018

Source: Slide and photo by Dr. Jude L. Capper, 2018
Global beef, pork and poultry consumption: 1980 - 2050

Source: Created by Dr. Jude L. Capper, 2018. Data from: Bauman and Capper (2011) Southwest Nutrition and Management Conference, Tempe, AZ.
The global livestock industry is under threat

Fight Climate Change with Diet Change

1 lb. of meat equals 2,463 gallons of water

MEAT's NOT GREEN

ALL ANIMALS HAVE THE SAME PARTS

ANIMAL PRODUCTS = SOLVE 80% GLOBAL WARMING PROBLEMS

http://animals.change.org/blog/view/save-the-animals-save-the-planet-blog-action-day-09-climate-change
http://www.peta.org/mc/ads/PAMpartsPETA300.jpg
Every dairy production system can be sustainable
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Every dairy production system can be sustainable
Sustainability and One Health are interlinked

- Environment
- Animal Health
- Ecosystem Health
- Social
- Economic
- Human Health

Source: Created by Dr. Jude L. Capper, 2018.
What does sustainability mean to the consumer?

- Seasonal fruit and veg: 36%
- Food waste: 34%
- Water use: 32%
- Use of natural resources: 31%
- Air and water pollution: 29%
- Animal welfare: 29%
- Healthy food: 28%
- Organic food: 28%
- Food safety: 28%

Source: Created by Dr. Jude L. Capper, 2018. Data from: Bouwman et al. (2016) Consumers’ Knowledge About the Determinants for a Sustainable Diet. SUSFANS, The Hague, The Netherlands. Web-survey of 5,043 consumers across 6 countries. Question: “In your opinion, which of these attributes have to do with sustainable food?” Highest agreement value of attributes shown = 49.0%, lowest 17.9%.
Dairy products have an intermediate carbon footprint compared to other foods.

All foods have an environmental impact

Source: Created by Dr. Jude L. Capper, 2018.
Meatless Mondays are widely promoted

FollowOurPassion
@abroomFOP

MAKE this delicious Dairy Free Turnip Potato Gratin for MEATLESS MONDAY
followourpassion.com/dairy-free-tur ...
#meatlessmonday #recipe #foodie

Source: Created by Dr. Jude L. Capper, 2018. Photo from: http://twitter.com
Livestock production is not the only contributor to the UK’s carbon footprint.

UK meat and dairy production accounts for ~6% of total UK GHG emissions (Dept. of Energy and Climate Change 2016).

Livestock production is not the only contributor to the UK’s carbon footprint.

If everybody in the UK went meat and dairy-free every Monday… the national carbon footprint would decrease by less than 1.0%.

Improving cattle productivity reduces environmental impact of milk and meat

- Total cattle
- Total time
- Growth rate
- Meat yield
- Milk yield
- Land
- Water
- Fuel
- GHG
- £££

A negative correlation exists between milk yield and carbon emissions.

British dairy herd performance relative to carbon emissions

Index compared to the mean (1=100%)

- **Best carbon ftpt**
- **Worst carbon ftpt**
- **Mean**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Best</th>
<th>Worst</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herd Size</td>
<td>1.2</td>
<td>1.11</td>
<td>1.00</td>
</tr>
<tr>
<td>Milk Sold</td>
<td>1.1</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Yield per Cow</td>
<td>1.0</td>
<td>1.0</td>
<td>0.98</td>
</tr>
</tbody>
</table>

Improving milk yield reduces energy use per unit of milk.

Energy requirement (MJ ME/d):
- 15 l/d: 9.4 MJ/l, 50% Maintenance, 50% Lactation
- 25 l/d: 7.5 MJ/l, 37% Maintenance, 63% Lactation
- 35 l/d: 6.7 MJ/l, 30% Maintenance, 70% Lactation
- 45 l/d: 6.3 MJ/l, 25% Maintenance, 75% Lactation

Dilution of Maintenance

Source: Created by Dr. Jude L. Capper, 2018; Calculation based on nutrient requirements for a 681 kg Holstein dairy cow (3.8% fat, 3.1% protein).
Improving milk yield reduces feed use per unit of milk.

![Graph showing the relation between milk yield and feed intake.](image)

Feed intake (kg DM/d):
- 15 l/d: 13.6 kg
- 25 l/d: 18.0 kg
- 35 l/d: 22.7 kg
- 45 l/d: 27.3 kg

Milk yield (litres/d):
- 15 l/d: 0.90 kg/l
- 25 l/d: 0.73 kg/l
- 35 l/d: 0.65 kg/l
- 45 l/d: 0.61 kg/l

Source: Created by Dr. Jude L. Capper, 2018; Calculation based on nutrient requirements for a 681 kg Holstein dairy cow (3.6% fat, 3.1% protein).
UK milk yields have increased over time

Annual Milk Yield (kg/year)

Year

GHG emissions from UK dairy vary, but were cut by 24% from 1990-2015

Efficiency losses increase environmental impact and economic cost

- Inadequate nutrition
- Reproductive failure
- Lameness
- Mastitis
- Metabolic disease
- Infectious disease
- Long dry period
- Late age at first calving
- Antibiotic residues
- Feed wastage
- Poor pasture management

Source: Created by Dr. Jude L. Capper, 2018.
Got...teats? Soybeans do not have mammary glands
Drinks vary in nutrient density and greenhouse gas emissions

<table>
<thead>
<tr>
<th>Drink</th>
<th>Nutrient Density</th>
<th>Carbon footprint g CO₂/g drink</th>
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<tbody>
<tr>
<td>Milk</td>
<td>53.8</td>
<td>99</td>
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<tr>
<td>Orange Juice</td>
<td>17.2</td>
<td>61</td>
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<tr>
<td>Soy Drink</td>
<td>7.6</td>
<td>30</td>
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<tr>
<td>Oat Drink</td>
<td>1.5</td>
<td>21</td>
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<tr>
<td>Red Wine</td>
<td>1.2</td>
<td>204</td>
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<tr>
<td>Soda</td>
<td>0.0</td>
<td>109</td>
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<tr>
<td>Beer</td>
<td>0.0</td>
<td>101</td>
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<tr>
<td>Water</td>
<td>0.0</td>
<td>10</td>
</tr>
</tbody>
</table>

Nutrient density should be included when assessing carbon footprint

\[
\text{NDC Index} = \frac{\text{Nutrient Density}}{\text{GHG Emissions}}
\]

<table>
<thead>
<tr>
<th>Beverage</th>
<th>NDC Index</th>
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<tbody>
<tr>
<td>Milk</td>
<td>0.54</td>
</tr>
<tr>
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<td>0.28</td>
</tr>
<tr>
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<td>0.25</td>
</tr>
<tr>
<td>Oat Drink</td>
<td>0.07</td>
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<tr>
<td>Red Wine</td>
<td>0.01</td>
</tr>
<tr>
<td>Soda</td>
<td>0.00</td>
</tr>
<tr>
<td>Beer</td>
<td>0.00</td>
</tr>
<tr>
<td>Mineral Water</td>
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</tr>
</tbody>
</table>

Can we grow human food crops everywhere?
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All these industries provide by-products fed to animals.
Feed efficiency metrics must consider competition for human-edible foods.

Source: Created by Dr. Jude L. Capper, 2018; data from Wilkinson (2011) Re-defining efficiency of feed use by livestock. Animal.
Feed efficiency ratios vary between systems and species.

- Dairy: 1.1
- Suckler beef: 27.5
- Cereal beef: 7.8
- Pork: 3.6
- Poultry: 2.0
- Eggs: 2.2

Source: Created by Dr. Jude L. Capper, 2018; data from Wilkinson (2011) Re-defining efficiency of feed use by livestock. Animal.
Dairy and beef have favorable human-edible protein input to output ratio

Source: Created by Dr. Jude L. Capper, 2018; data from Wilkinson (2011) Re-defining efficiency of feed use by livestock. Animal.
Are provocative messages influencing consumers?

Alternative beverages are gaining market share – but does this represent a shift to vegetarian and vegan diets?

Source: Created by Dr. Jude L. Capper, 2014. Photo from: http://dogsnwire.com/media/C1LXdDoUUAAYVZKH.jpg
This year, #Veganuary was trending

TRY VEGAN THIS JANUARY
Take the Pledge at Veganuary.com

This year, #Veganuary was trending

Globally, 168,500 people took part

101,100 (60%) Vegan
Vegetarian
Pescetarian

67,400 (40%) Omnivores
(Population of Stafford)

2,925 confirmed staying vegan

How do you convert a vegan?
When I was 15, I was a vegan
Let’s make #Februdairy happen! 28 days, 28 positive #dairy posts. From cute calves and #cheese on crumpets, to belligerent bulls and juicy #beef #burgers - who's in? #SmxConf18
28 days of positive dairy posts
5 easy tips for positive communication

- Share your values
- Stay positive, polite and personal
- Keep it short, simple and see-through
- Agree to disagree
- Know when to walk away

Source: Created by Dr. Jude L. Capper, 2018.
Phil Nash
@PhilNash2

Replying to @CallananDarragh @Bovidiva and 6 others

We nurture our cows, give them the best food, bedding and comfort in order that they’re free of stress, fear and discomfort. Regardless of what you feel motivates us, the vast majority of Farmers do it because they love their animals ❤️ (more than they love their family!)

2:26 PM - 30 Jan 2018

Source: Created by Dr. Jude L. Capper, 2018. Photo from: http://twitter.com
Dairy products contain pus, hormones, antibiotics, and carcinogenic properties. Happy
#NationalCheeseDay 😁
04/06/2018, 14:00
Can the hormones in dairy have impacts on our bodies?

1 litre of milk = 10 ng oestrogen

Contraceptive pill = 35,000 ng oestrogen

One pill = 3,500 litres of milk
Every single day.

Suggestive messaging often used by anti-dairy activists

**Why is almond milk better than cow’s milk?**

- Baby almonds are not taken away from their moms after birth.
- Almonds don’t suffer.
- Almonds drink less water.
- Almonds are not forced to live in their own waste.
- Almonds don’t generate 450+ million tonnes of manure annually.
- Almonds are not forcibly raped.
- Almond milk is healthy and doesn’t contain antibiotics and pus.

Source: Created by Dr. Jude L. Capper, 2018. Picture from: [https://twitter.com/bovidiva/status/11666648989556](https://twitter.com/bovidiva/status/11666648989556)
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WHY IS ALMOND MILK BETTER THAN COW MILK?

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Source: Created by Dr. Jude L. Capper, 2018. Picture from: https://twitter.com/drjudecapper/status/921821869646969285
Keep it short, simple and see-through

Kirsty
@Dairy_is_scary

Rape rack

Source: Created by Dr. Jude L. Capper, 2018. Photo from: http://twitter.com
Sometimes we have to agree to disagree

Moonmoon Glitterkiss
@buatharfuath

I'm a vegan and I live in a farming community. No amount of talking or "education" made the fact that the cows who were no longer "useful" were brought to slaughter.

16/01/2018, 23:09
Phillectual
@phillectual

@Bovidiva Why would someone who had breast cancer consume #dairy? WTF? Don’t be shocked when the cancer comes back, lol.

We got the science, more and more people wake up every day, your psychopathic industry is slowly dying - and we can’t wait for it to be gone. Go #vegan.

8:33 PM - 28 Jan 2018
#Februdairy: blood, sweat, tears and awful lot of cheese...
...leading to some really bad activist Photoshopping
The livestock industry has an image problem

Some on-farm practices cannot be justified

Mail Online

Viewers' outrage over harrowing scenes of day-old calves being lined up and shot DEAD just because they're male

- Three Jersey calves were filmed being killed on the Channel 4 programme featuring farmer Jimmy Doherty
- Nearly 60 people complained about the graphic scenes aired at 9.30pm on Tuesday

By PAUL REVOIR FOR MAILONLINE

Harrowing scenes of newly-born dairy calves being lined up and shot dead simply because they are male have left television viewers sickened.

The images of three Jersey calves being killed were filmed to highlight the grim reality of the dairy industry.


When talking to consumers, it’s impossible to justify killing male dairy calves on the basis of economic cost.
Consumer perception equals cruel reality?

We should always think twice before posting images that can be misconstrued on social media.

Source: Created by Dr. Jude L. Capper, 2018. Photo from http://www.facebook.com

Farmers Guardian
When you get caught trying to sneak off the farm early... 😅
Consumer perception equals cruel reality?

Tracey Alison
@traceyalison1

This calf is about to be killed with a bolt gun. Give a 🙌 & go #vegan

Source: Created by Dr. Jude L. Capper, 2018. Photo from: http://twitter.com
Consumer decision making: cultural cognition. We trust people we admire.

Jamie Oliver
@jamieoliver

The latest from Jamie Oliver HQ. Order your copy of 5 Ingredients - Quick & Easy Food here: jamieol.com/QuickEasyTW

© London & Essex Jamie
Born on 27 May

Nigella Lawson
@Nigella_Lawson

Nigella Lawson's eating - and other - updates. If you need to contact me for work, do not call here, but email Jonny Geller. gelleroffice@curtisbrown.co.uk

© London Nigella

Leonardo DiCaprio
@LeoDiCaprio

Actor and Environmentalist

© Los Angeles, CA Leonardo
144 Following

Joe Marler
@JoeMarler

all views are my own. Represented by @Esportif, contact for party bookings etc. @ProAthleteSupps addict.

Source: Created by Dr. Jude L. Capper, 2018. Images from: http://Twitter.com
Use cultural cognition by reaching out to celebrities to promote agriculture

England rugby player credited <3 week recovery from broken leg to drinking 2 pints of milk per day.

Source: Created by Dr. Jude L. Capper, 2017. Screenshot from: http://www.telegraph.co.uk/rugby-union/2017/02/02/england-prop-joe-marler-reveals-secret-behind-his-remarkable/
Need to communicate with consumers who don’t have fixed opinions of farming.

Focus here

Opinion of Issue X

Source: Created by Dr. Jude L. Capper, 2018.
Need to promote trust to ensure social acceptability and sustainability

- Perceived lack of concern
- Unrealistic images
- Complicated justifications
- Opacity

- Shared values
- Realistic images
- Clear answers
- Transparency

Source: Created by Dr. Jude L. Capper, 2018.
Thank you!

jude@livestocksustainability.com
http://bovidiva.com/presentationlinks

Source: Created by Dr. Jude L. Capper, 2018.