Webbinariet Proteinutnyttjande
18 November 2026

Hur klarar sig Finland utan soja i nötkreaturens foder?

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There is political will at EU and Finnish level to increase protein self sufficiency

- Finnish dairy and beef production is soya-free
- Soy-based protein is used for pigs and particularly poultry

Soijasta luopuminen Suomessa ei ole utopiaa

Maa- ja metsätalousministeri Jari Leppä (kesk) esitti elokuun lopulla Suomesta soijatonta vuoteen 2025 mennessä. Vaikka tavoite rehusoijasta luopumisesta on erittäin kunnianhimoinen, se ei ole mahdoton. Kilpailukykyämme entisestään heikentävään

A 34 HELSINGIN SANOMAT TORSTAINA 29.8.2019

TALOUS

Maatalous: Meijeriyhtiöitä ja lihataloja on jo luopunut Suomessa soijan käytöstä tai vähentänyt sitä

Ministeri karsisi soijarehun käyttö

Tulli pitää ministeri Jari Lepän tavoitetta epärealistisena.

Liisa Kauppinen HS

MAA- JA metsätalousministeri Jari Leppä (kesk) linjasi tiistaina kannanotossaan, että Suomesta on tehtävä täysin soijaton vuo-

KALLE KOPONEN / HS



Maatalous

Ensimmäinen Suomessa, ehkä koko maailmassakin? WestFarmin emakkosikala toimii täysin ilman soijaa, kotimaisella valkuaisella

Maatalous 10.02.2021
Satu Lehtonen

"Ympäristönäkökulma on meille erittäin tärkeä", sanoo yksi yhtiön omistajista, Henrik Holm.

CHRISTOFFER THOMASFOLK



WestFarmin omistajat ovat vasemmalta Kjell-Göran Paxal, Anders Lillandt, Tomas Långgård ja Henrik Holm.

Soya has become the ”bad plant” that is blamed ruthlessly

- Land use change in Tropics – loss of rainforests
- GMO varieties common e.g. in Americas
- Careless use of pesticides
- Dependency of export countries on price and availability – risks related to politics and various crises
- Biohazards (e.g. salmonella) linked with imports

- Soya has many good characteristics as well!
- The soya aversion has however activated the seek for alternative local protein production with many benefits



Photo: Marketta Rinne / Luke

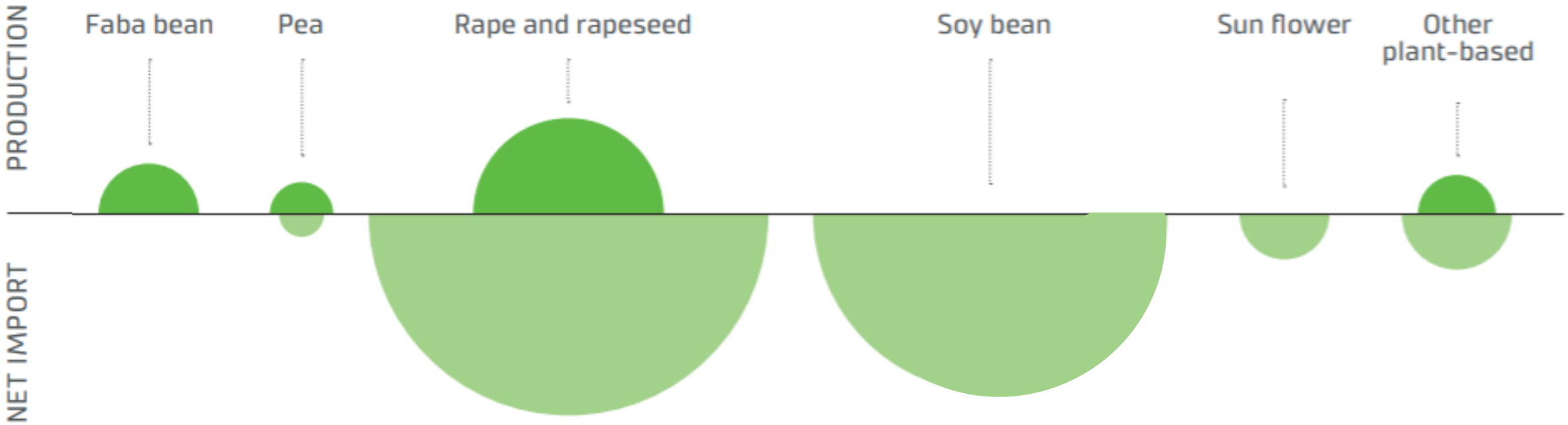
Soya bean meal is not used in cattle production in Finland

- Since March 2018, no soya bean based feeds have been used for dairy cows in Valio, the coopartaive dairy that covers 80 % of Finnish milk
  - Until then small amounts of soya been meal were included in feeds for calves
- Also other companies (dairy and beef) do not use soya bean protein in Finland
- Soya bean meal is however used for pigs and particularly poultry

- The main protein feed for cattle is rapeseed meal
  - But only about 1/4 of it is produced in Finland

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Protein self-sufficiency of feed materials used as protein supplements in Finland



Source: ScenoProt / Luke Policy Brief 7/2018

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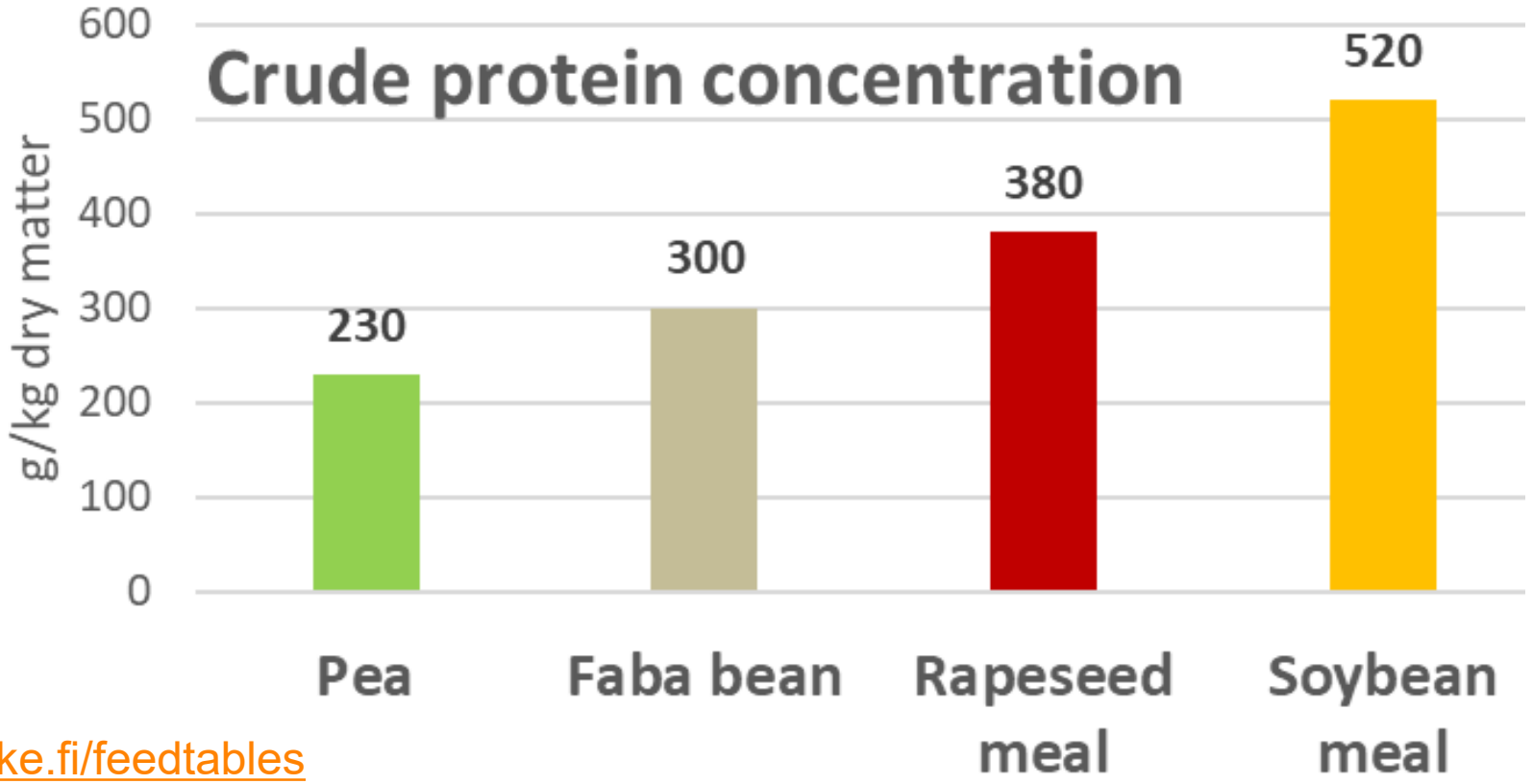
Protein self-sufficiency of feed materials used as protein supplements in Finland

		Feed material, million kg	Protein, million kg	Proportion of protein, %
Rapeseed	Domestic	90	19	8.1
Rapeseed	Imported	40	9	3.8
Rapeseed meal	Imported	290	101	42.1
Soya bean meal	Imported	156	70	30.0
Pea	Domestic	20	4	1.7
Faba bean	Domestic	56	13	5.6
Barley protein feed	Domestic	50	18	7.7
Total		702	234	100
Protein self sufficiency, %				23.1

Source: Antti Laine / ScenoProt, 2019
https://www.slideshare.net/LukeFinland/antti-laine-palkokasvimarkkinat

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Soya bean meal is superior in protein concentration and amino acid profile compared to other protein feeds



Source: www.luke.fi/feedtables
Note that the CP concentration of whole rapeseeds is 240 g/kg DM

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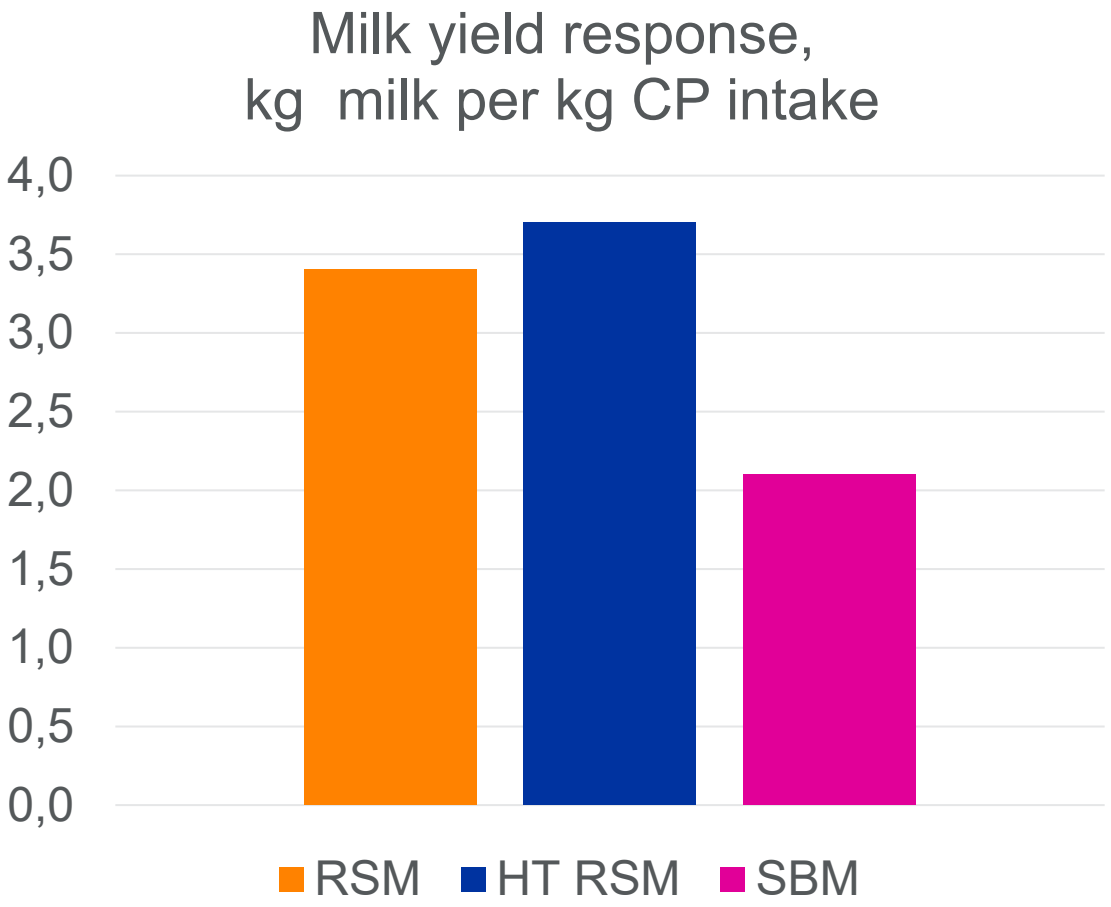
The Finnish Feed tables show very small difference in the amino acid value (AAT) of rapeseed and soya bean meals to ruminants

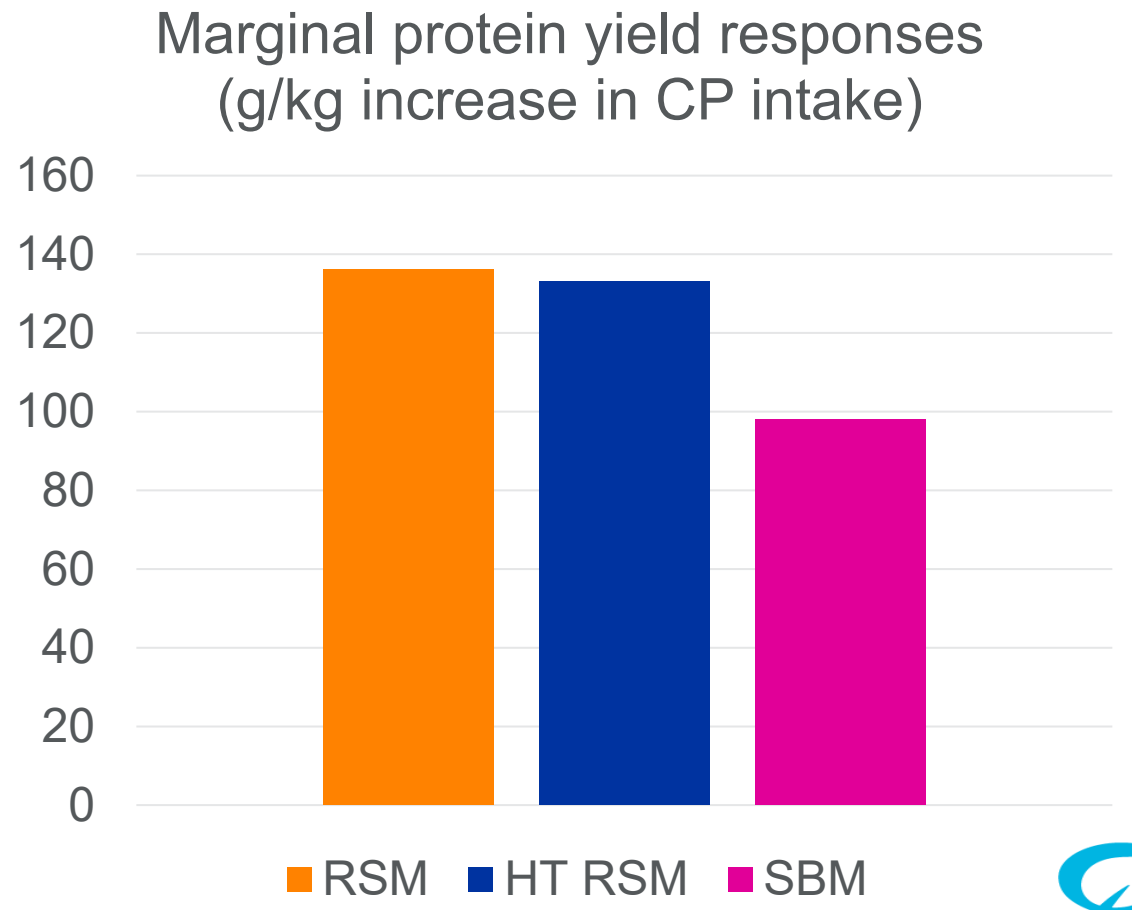
	Rapeseed meal	Soya bean meal
Crude protein	379	520
EPD (effective protein degradability, Finnish)	0.63	0.75
AAT (Finnish)	169	173
PBV (Finnish)	154	285

Source: www.luke.fi/feedtables

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The basis for Feed value calculations is in the production responses of dairy cows, which is the ultimate test of feeds



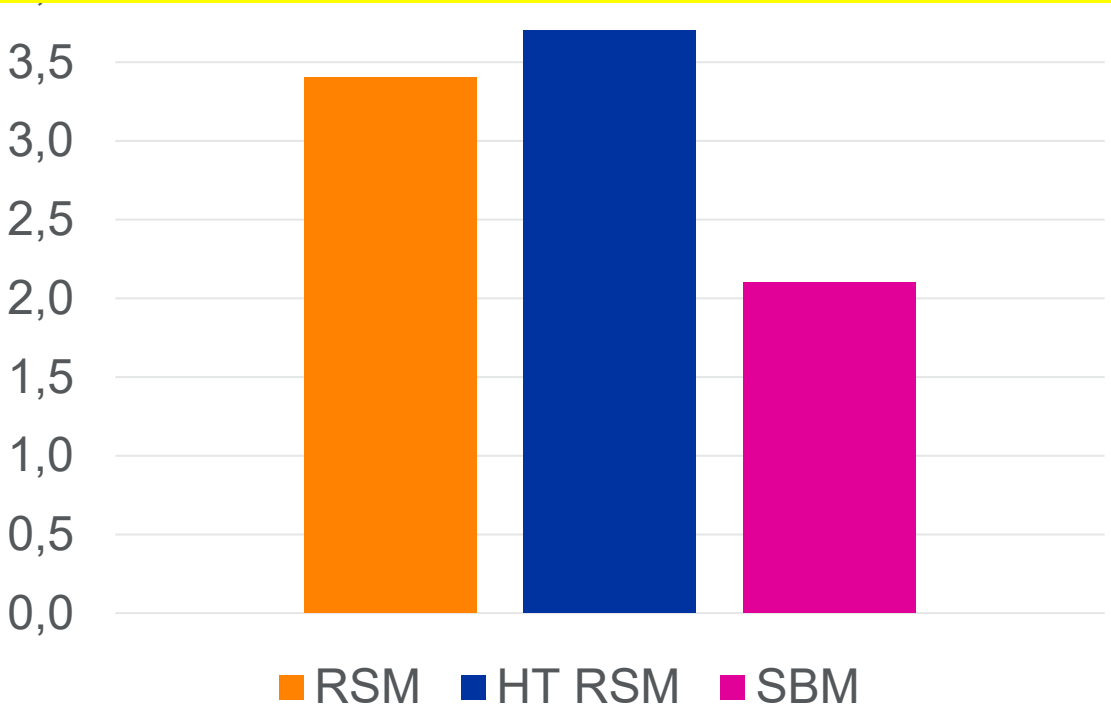


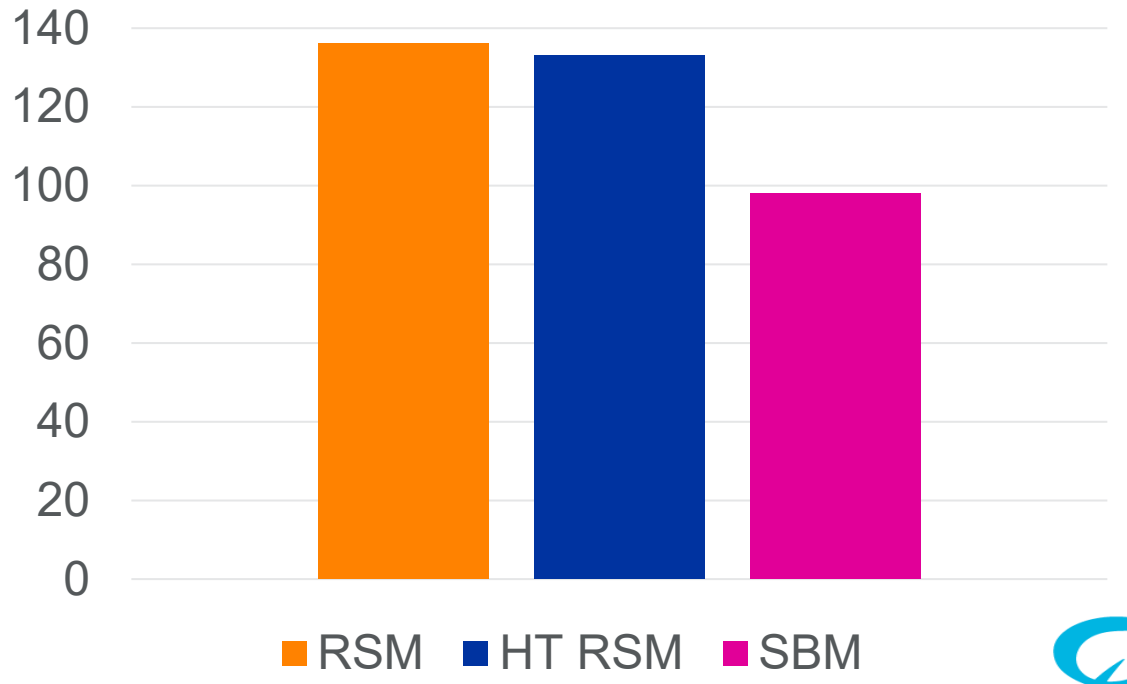
Huhtanen, P., Hetta, M., Swensson, C., 2011. Evaluation of canola meal as a protein supplement for dairy cows: A review and a meta-analysis. Canadian Journal of Animal Science 91, 1-15.

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The basis for Feed value calculations is in the production responses of dairy cows, which is the ultimate test of feeds

Based on the production responses, there was very little incentives for feed companies or farmers to use soya bean based feeds even before the desicion was made within the supply chain



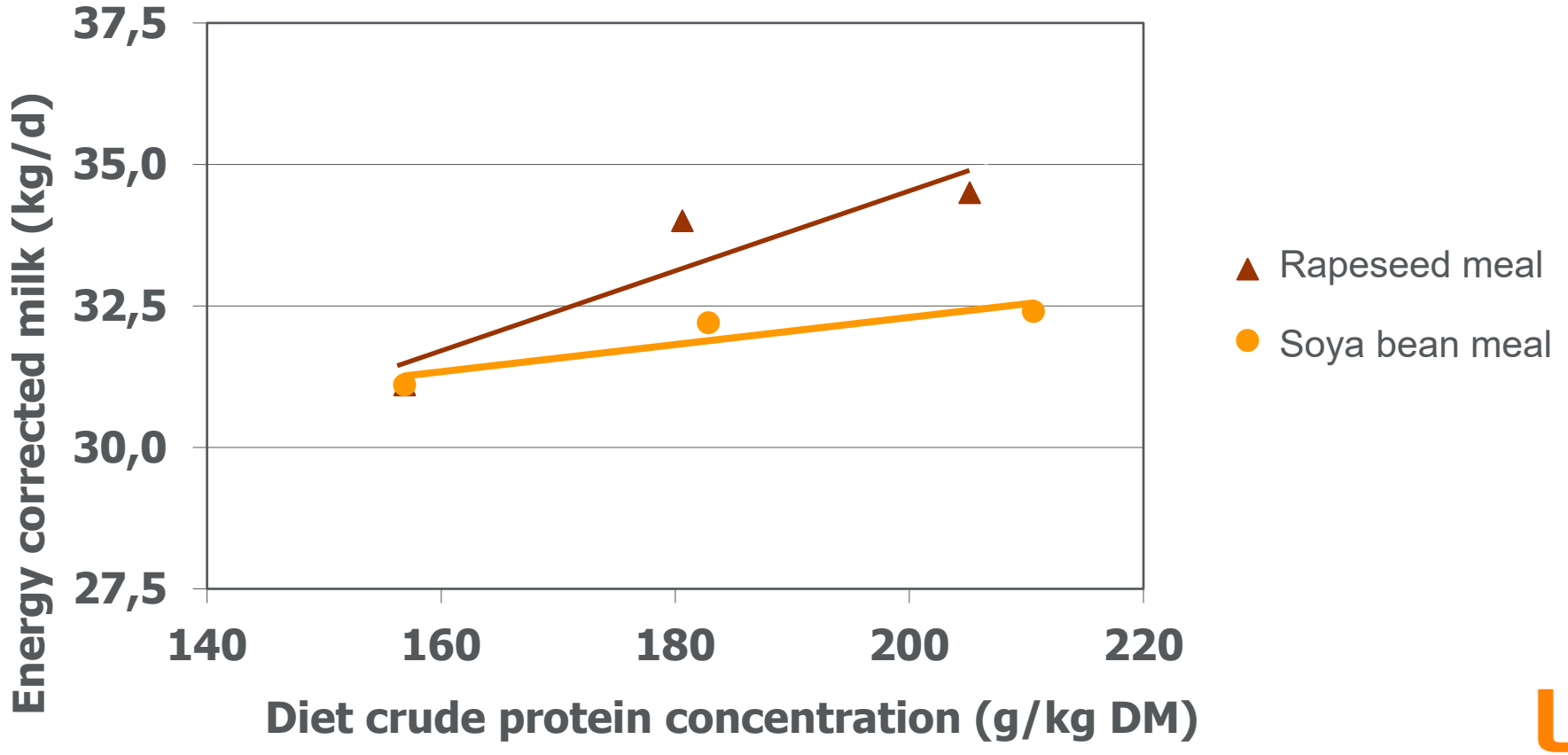


Huhtanen, P., Hetta, M., Swensson, C., 2011. Evaluation of canola meal as a protein supplement for dairy cows: A review and a meta-analysis. Canadian Journal of Animal Science 91, 1-15.

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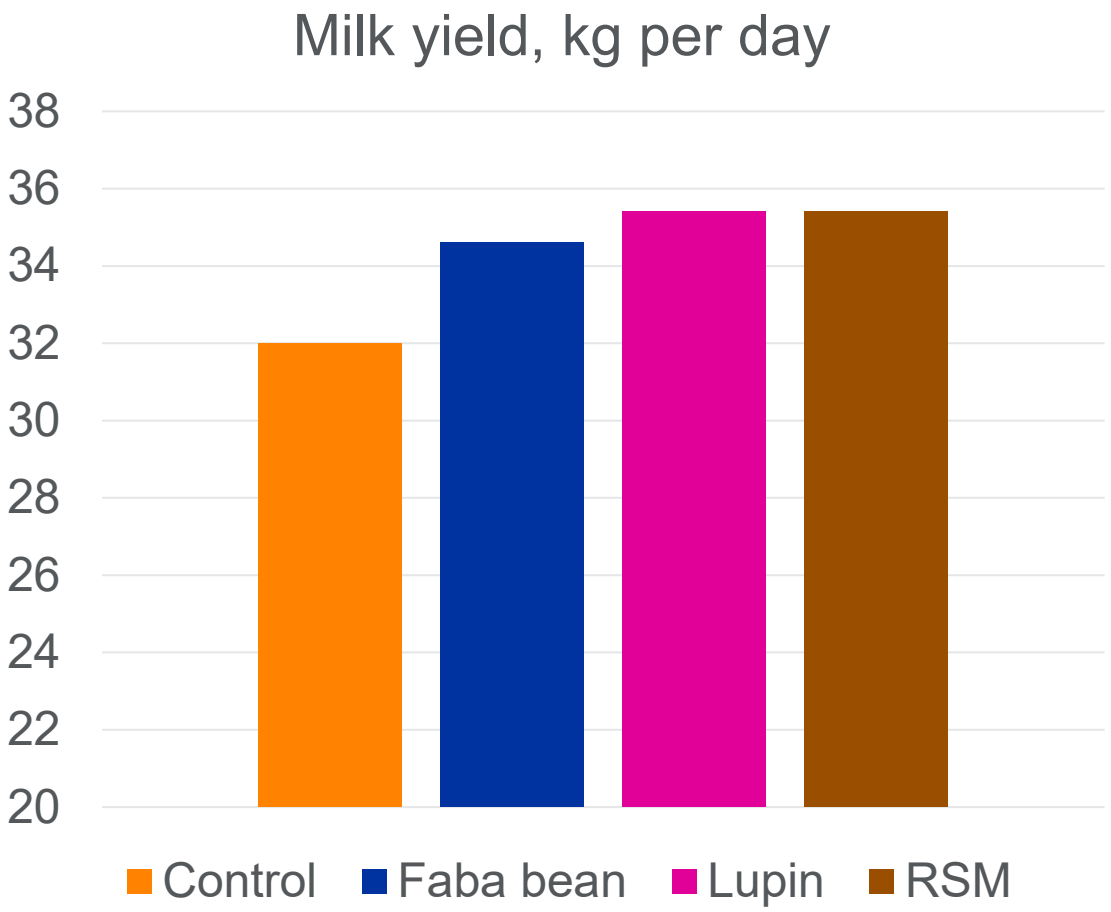
From production point of view, there is no need to use soya for dairy cows fed grass silage based diets

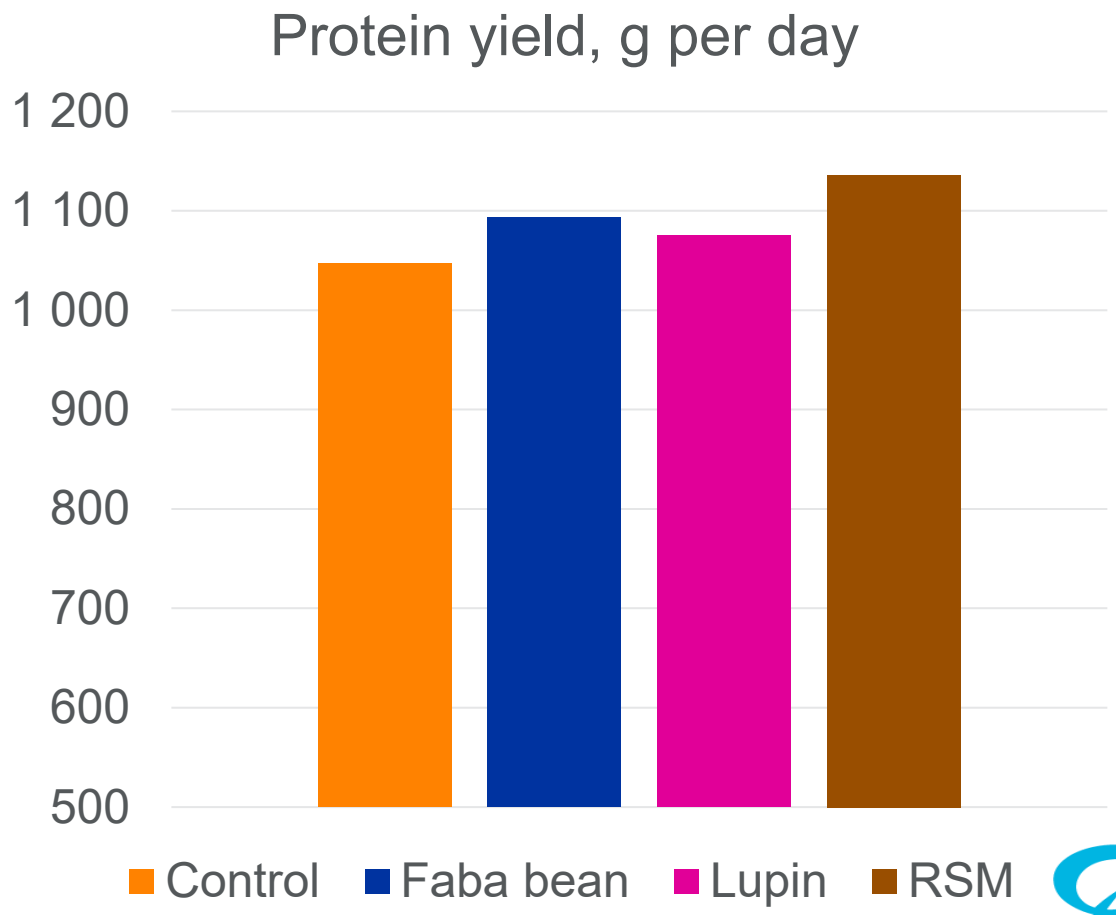
Rinne, M., Kuoppala, K., Ahvenjärvi, S. & Vanhatalo, A. 2015. Dairy cow responses to graded levels of rapeseed and soya bean expeller supplementation on a red clover/grass silage based diet. Animal 9: 1958-1969.



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What about some other domestic sources for protein supplementation compared to rapeseed meal (RSM) for dairy cows?

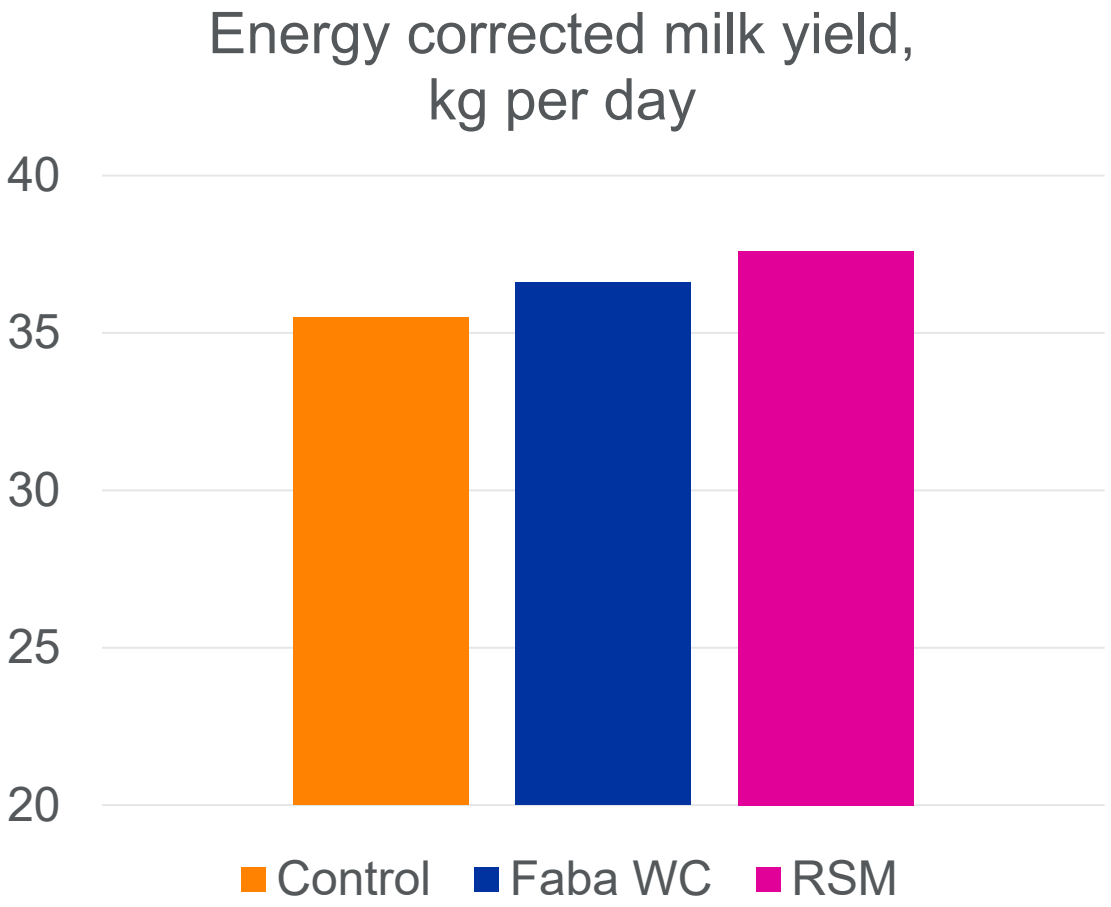


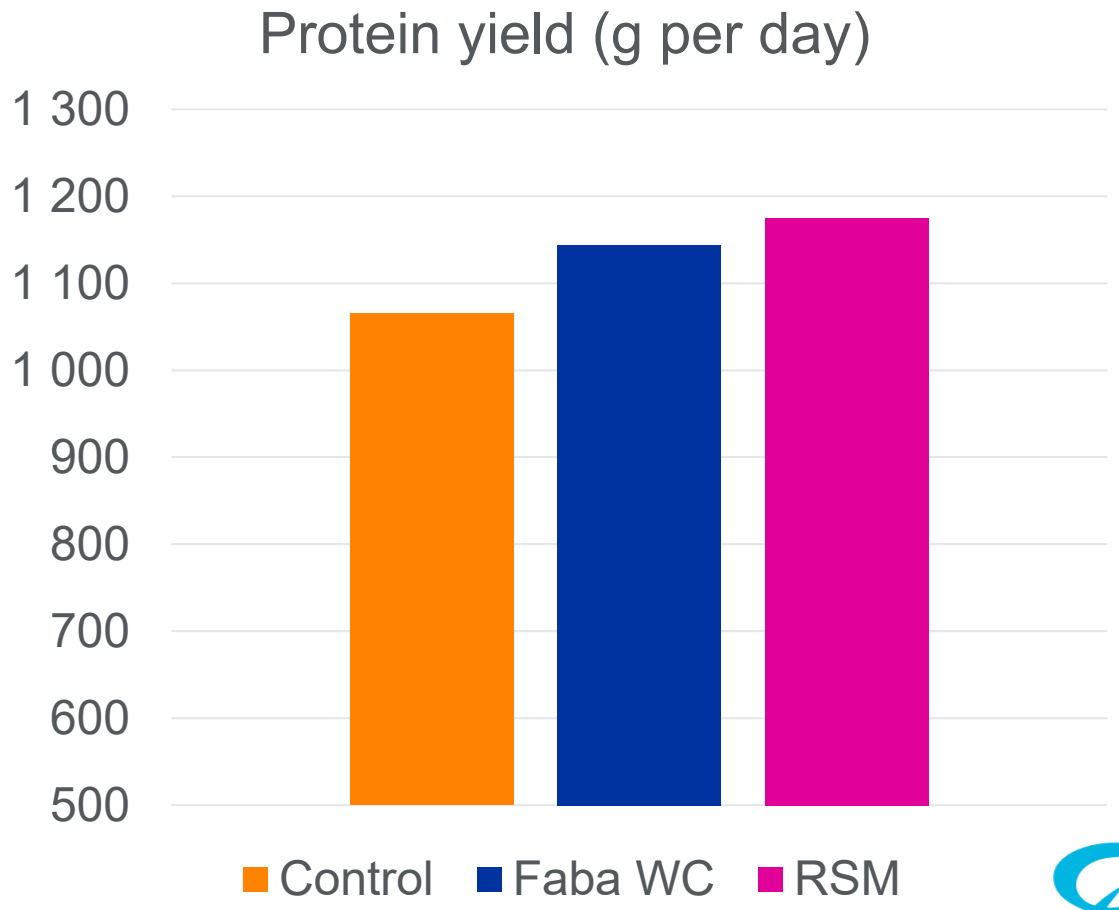


Kuoppala, K., Jaakkola, S., Garry, B., Ahvenjärvi, S. &. Rinne, M. 2021. Faba bean, blue lupin and rapeseed meal as protein supplements for dairy cows fed grass silage based diets. Animal 15: 100300.

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Same amount from crude protein from faba bean whole crop silage (Faba WC) was less effective than rapeseed meal (RSM) supplementation

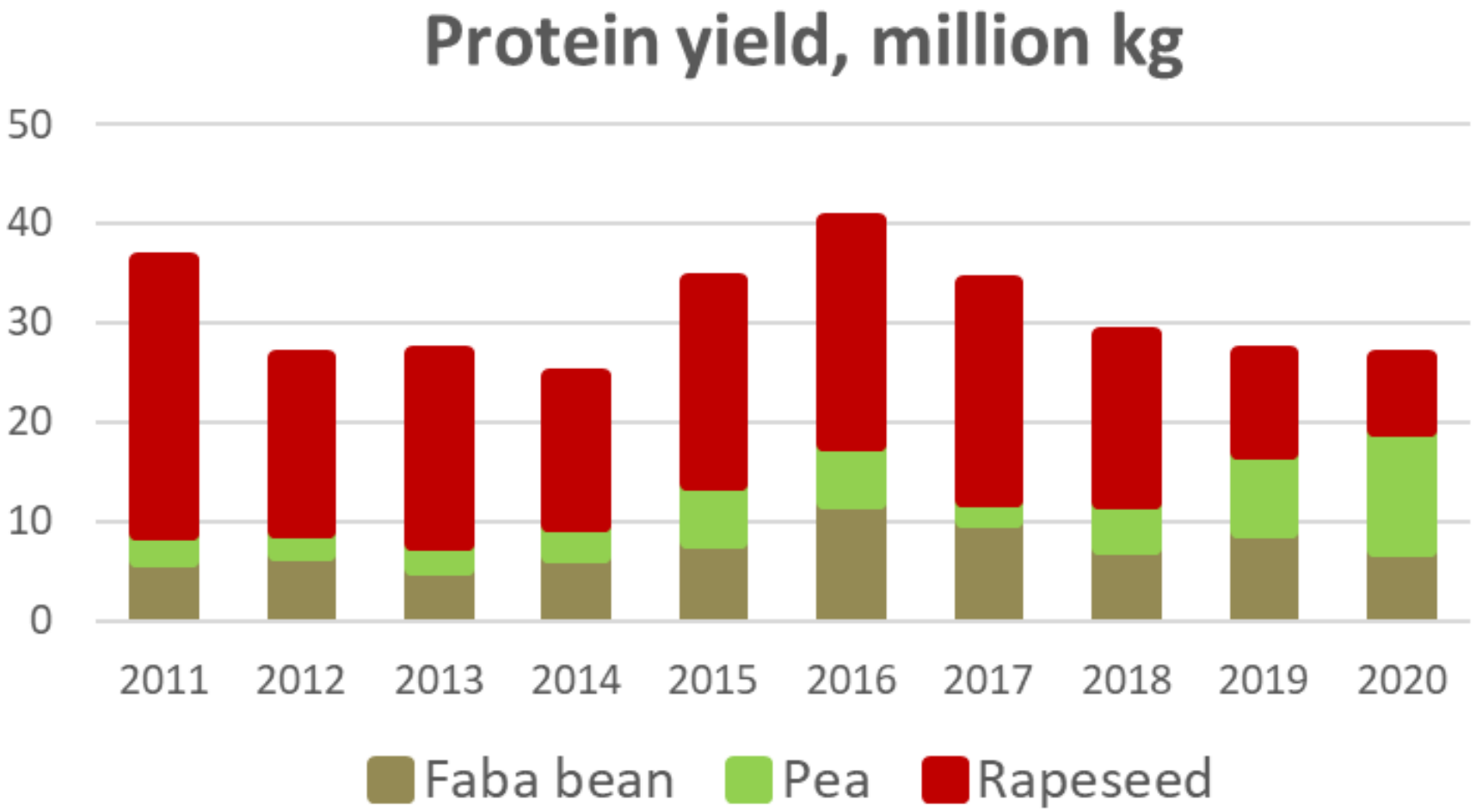




Palmio, A., Sairanen, A., Kuoppala, K. & Rinne, M. 2021. Milk production potential of whole crop faba bean silage compared with grass silage and rapeseed meal. Manuscript.

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Current trends in protein crop production in Finland



Note that soya bean **protein** import is ca. 70 milllion kg and rapeseed import 110 million kg

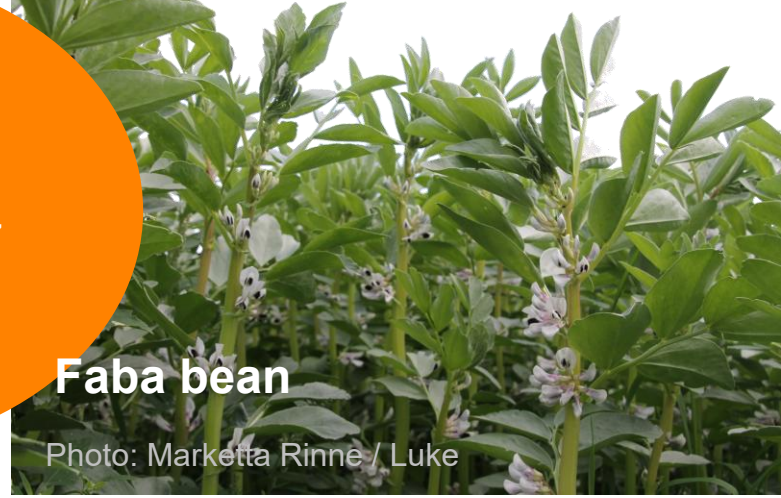
Source: https://stat.luke.fi/en/

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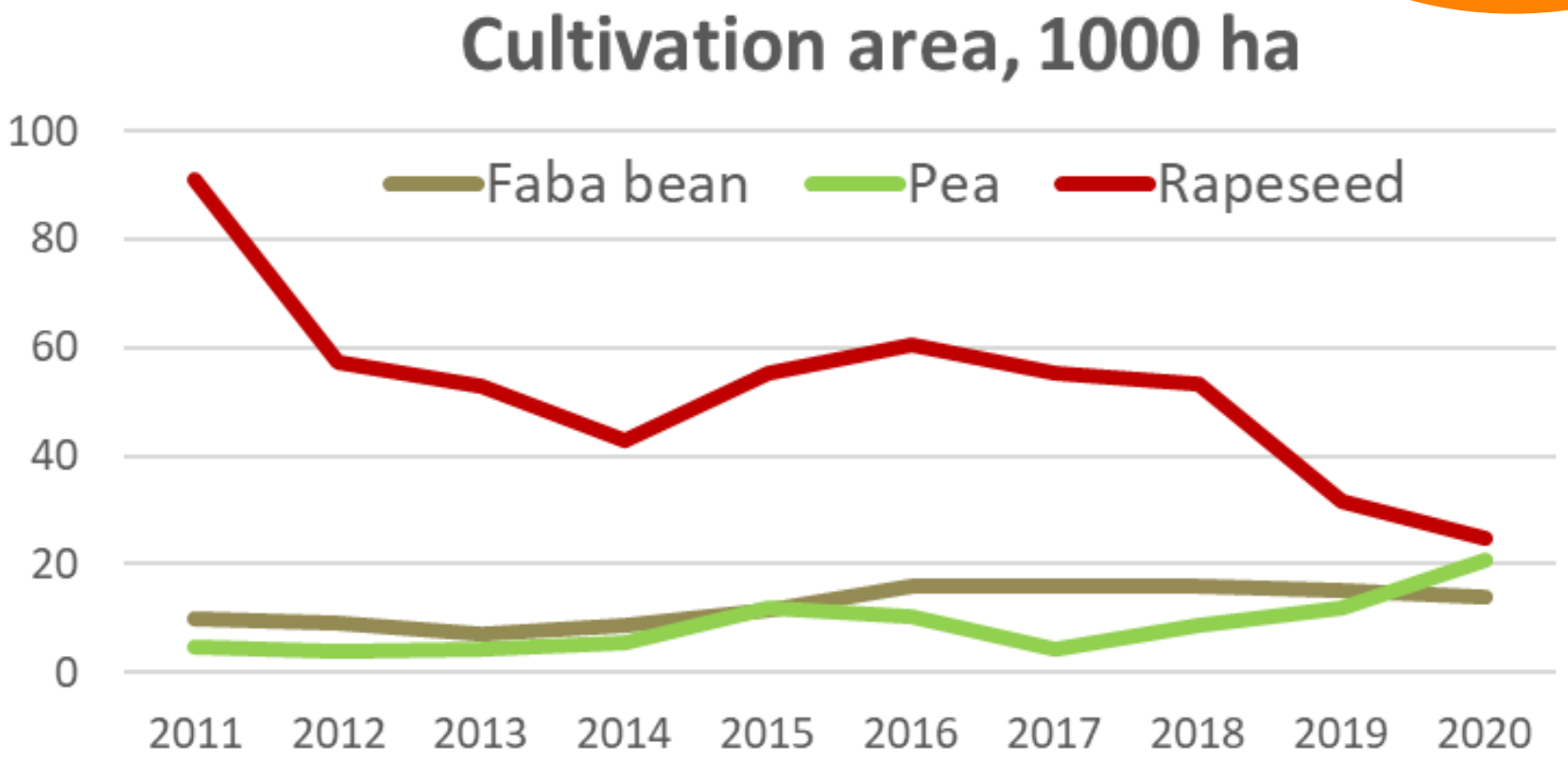
Current trends in protein crop production in Finland

Note: In 2020, barley was cultivated on 387 000 hectares.







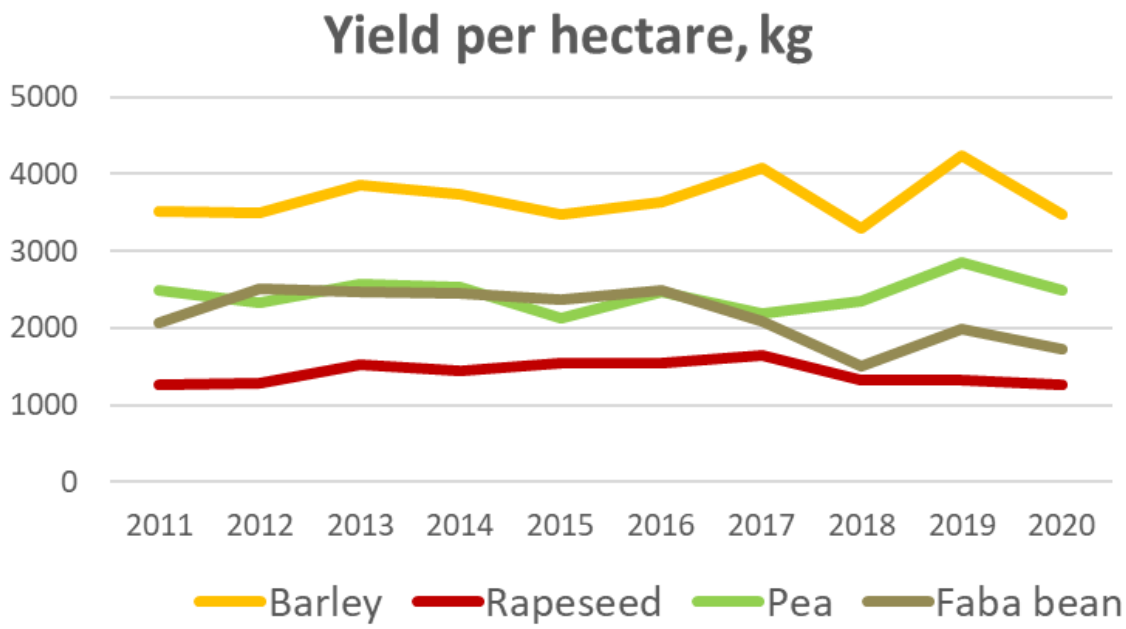


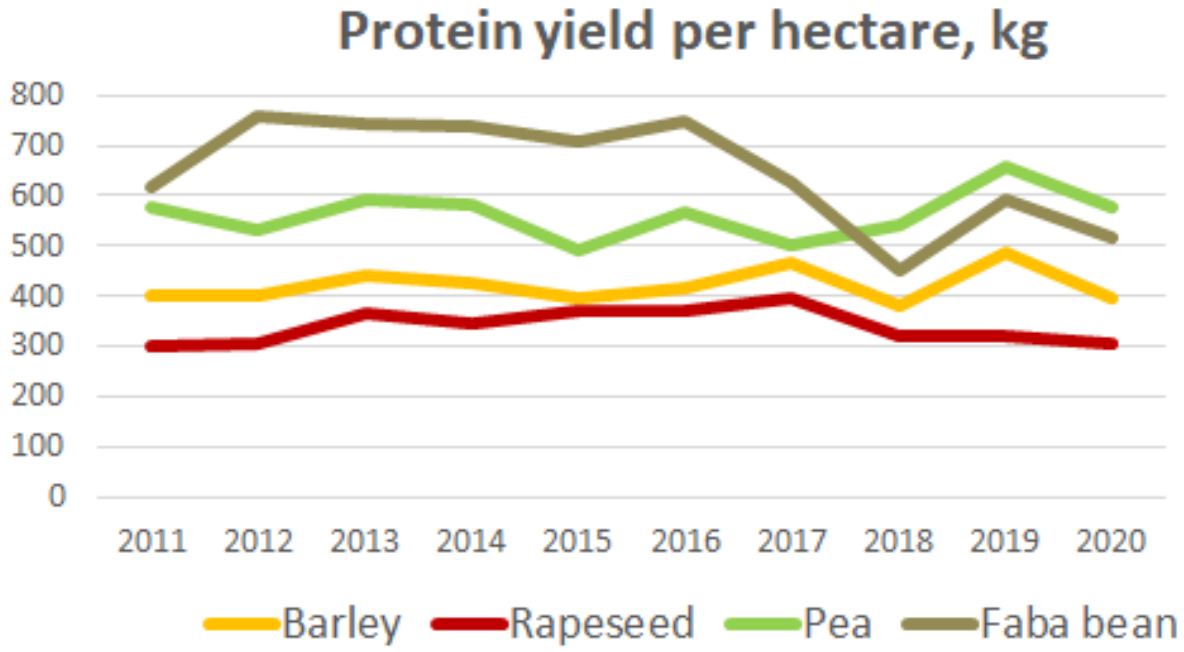
Source: https://stat.luke.fi/en/

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Source: https://stat.luke.fi/en/

The yields of protein crops are low compared with e.g. barley, but protein yields change the order











Replacement of imported soya bean is theoretically possible but practically unfeasible

- To replace 70 milj. kg of imported soya bean protein would require over 100 000 ha of faba bean
- This was calculated using a protein yield of 650 kg/ha from faba bean
- The current cultivation area of faba bean is 14 000 ha
- More practical and political support to increase protein crop production?


Photo: Marketta Rinne / Luke

While importing soybean meal and rapeseed meal, Finland is exporting cereals

- Why are farmers not responding to the situation?
  - Protein crops require long growing season and good weather conditions – the risks of crop failure are higher than in more robust cereals
  - The economic success + markets need to be in sight
- How to change the situation?
  - The expertize and experiences in growing protein crops is increasing
  - New varieties and warming climate improve the prospects
  - Political support and well-directed subsidies needed



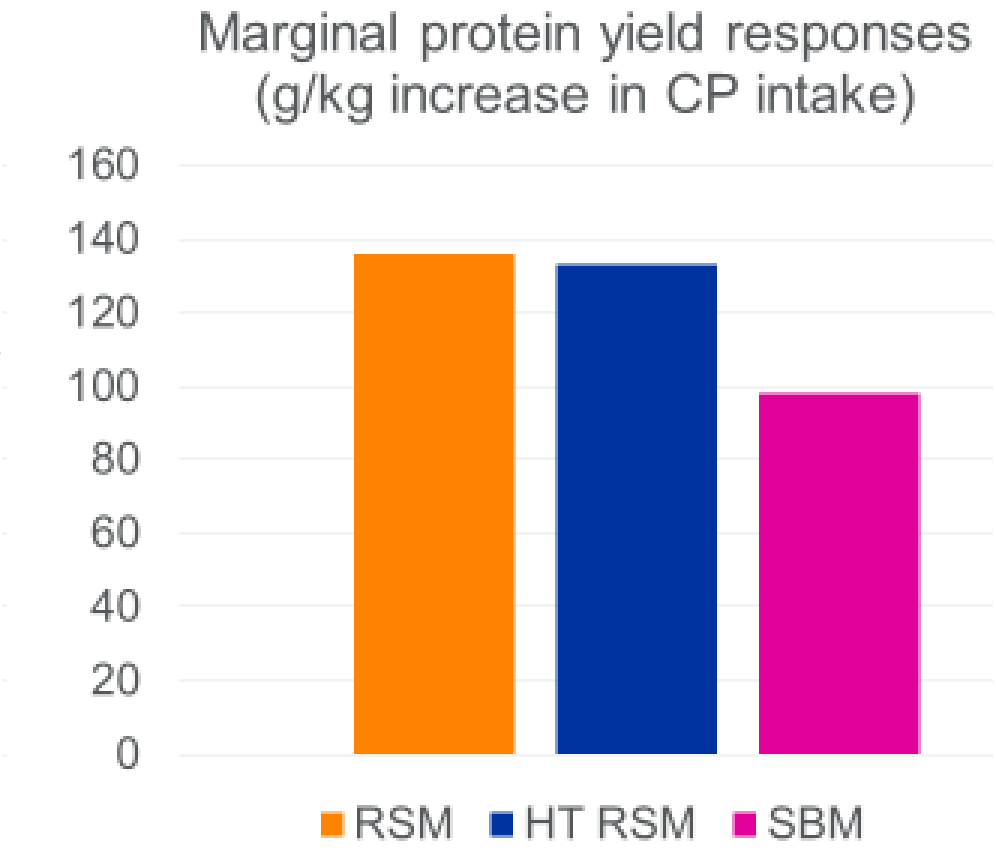
Remember: Finland imports more rapeseed than soy protein: 110 vs. 70 million kg

- Instead of replacing protein feeds with other feeds, we could change feeding strategies: use less protein supplements and utilize the evolutionary benefit of the cows – the rumen
- Reduction of rapeseed protein use for ruminants would allow greater use of it for monogastric animals
- The productivity of ruminants would be only marginally sacrificed if supplemental protein feeds would be reduced
- Could this be a viable approach in future from economic, environmental and ethical point of view?



Photo: Marcia Franco Luke

Note that only very small amount of the adidtional feed protein is transformed into milk protein



For RSM based feeds: 13.5 %
For soya bean feeds: 9.8 %

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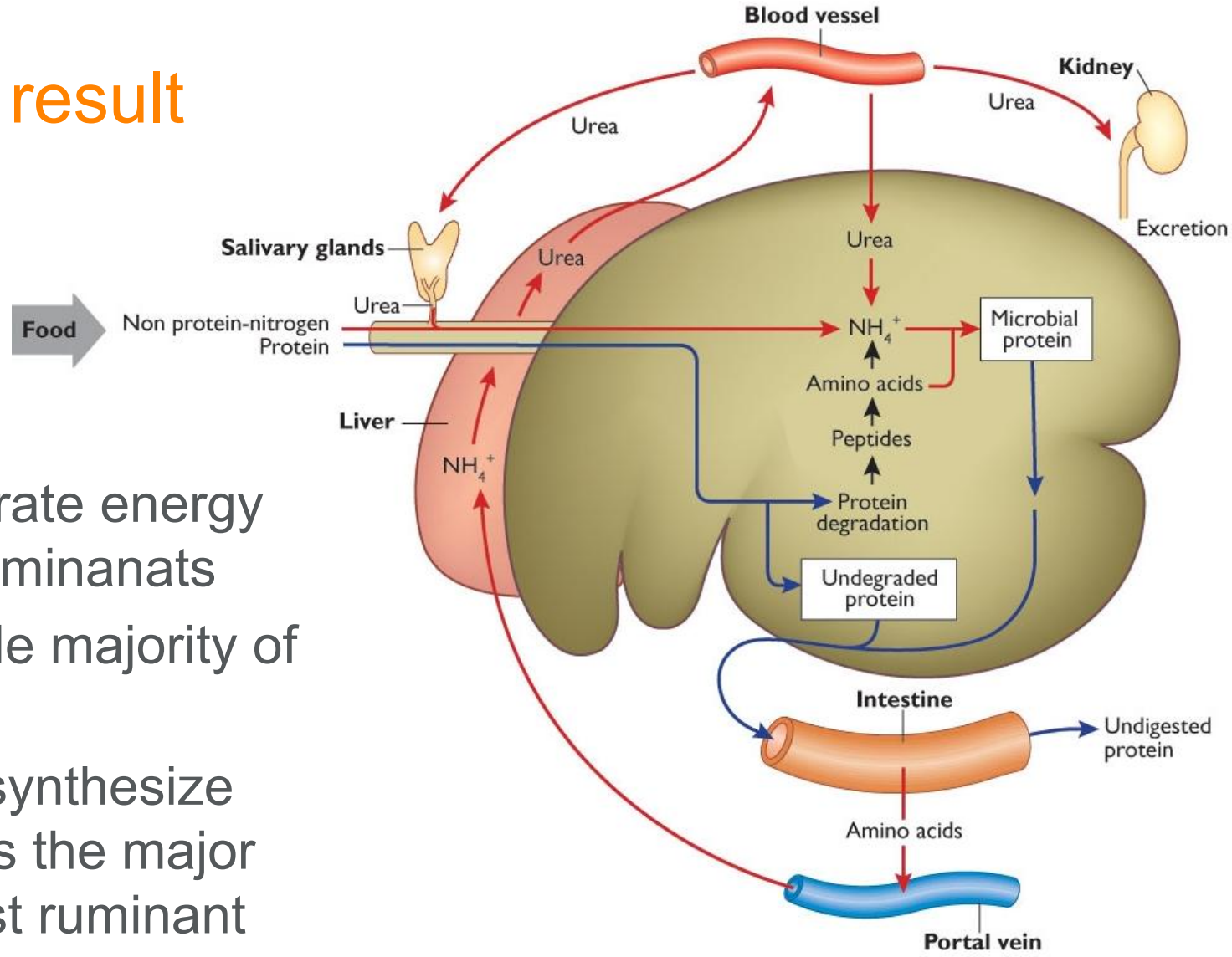
Milk production responses to protein supplementation are limited. In the Table, the increase (control without protein supplementation vs. highets amount of supplementation in the experiment) is presented.

Reference	Protein feed used	Response to protein supplementation, %	
		ECM* production	Protein production
Rinne et al. 2015	Rapeseed expeller	10.9	12.8
Kuoppala et al. 2016	Rapeseed meal	0.3	8.6
Lamminen et al. 2017	Rapeseed meal	5.6	4.6
Sairanen et al. 2020	Rapeseed meal	4.8	7.7
Rinne et al. 2015	Soya bean expeller	4.2	6.7
Kuoppala et al. 2016	Faba beans	-0.9	4.5
Lamminen et al. 2017	Microalgae	3.1	0.3
Ahvenjärvi & Huhtanen 2018	Urea	4.0	8.5
Mean		**4.0**	**6.7**

*Energy corrected milk

Rumen is a genious result of evolution

- It is not possible to separate energy and protein feeding of ruminanats
- Rumen microbes degrade majority of feed proteins
- On the other hand they synthesize microbial protein which is the major protein source of the host ruminant



Sjaastadt ym. 2003

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Milk Production of Cows on Protein-Free Feed

Studies of the use of urea and ammonium salts as the sole nitrogen source open new important perspectives.

Artturi I. Virtanen

Science 153 (1966): 1603 -1614.

The cow has a key role as a producer of protein and also of many vitamins. Both milk and meat proteins are of high biological value. If the vegetable diet, containing mostly cereals, which is the normal diet of most of the world's population, could

necessary for the maintenance of the cow. This is nearly twice as much protein as there is in 1 kilogram of milk. Because utilization of nutrients by the body in ruminants is very different from the utilization in other mammals, the fermentation processes in

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Photo: Luke/Marketta Rinne

Finnish Nobel Prize winner A.I. Virtanen maintained cows on amino acid free diets for several generations

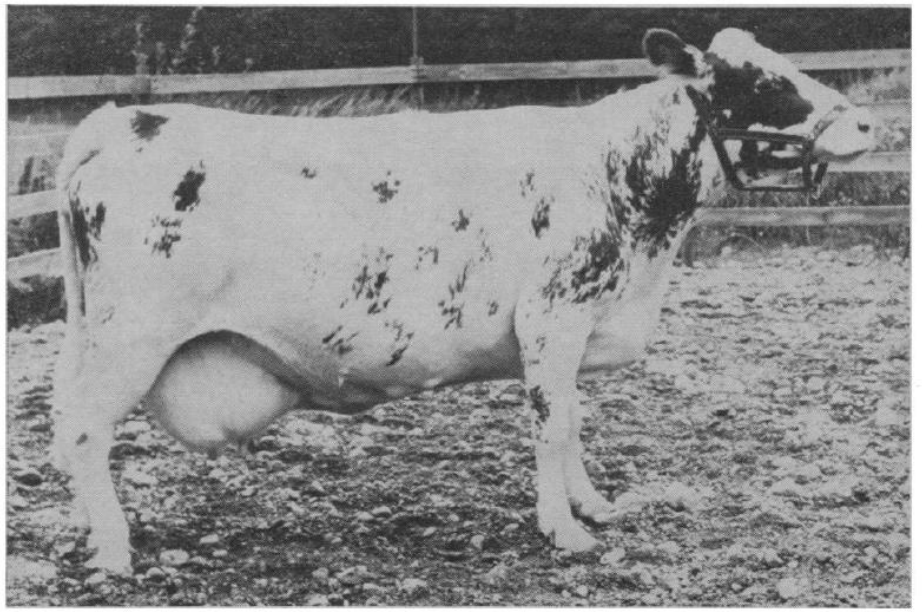


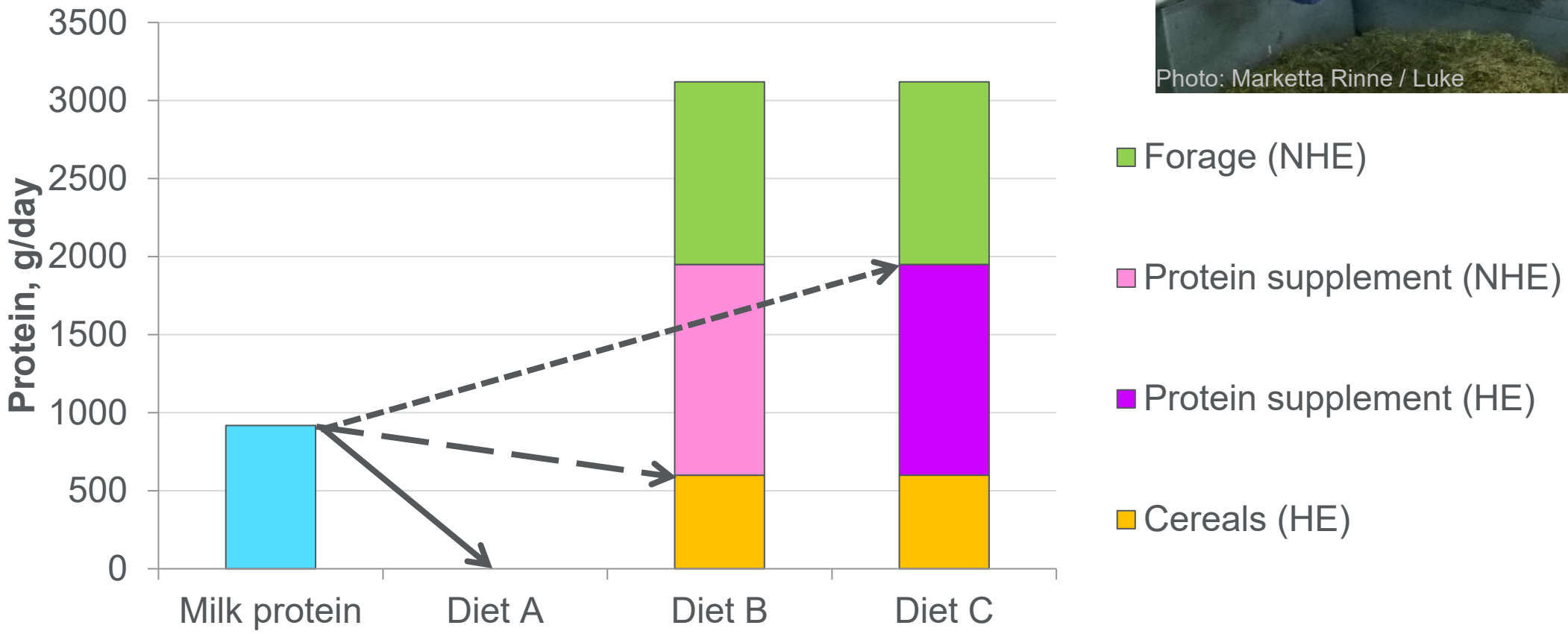
Fig. 3. Test cow Metta after being on test feed 370 days from calving.

Amino acid free feeds for cattle: Cardbroad as roughage and pellets from potato starch, sugar, cotton and urea

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Rumen is a protein synthesizer allowing to upgrade feeds into high quality foods


Photo: Marketta Rinne / Luke

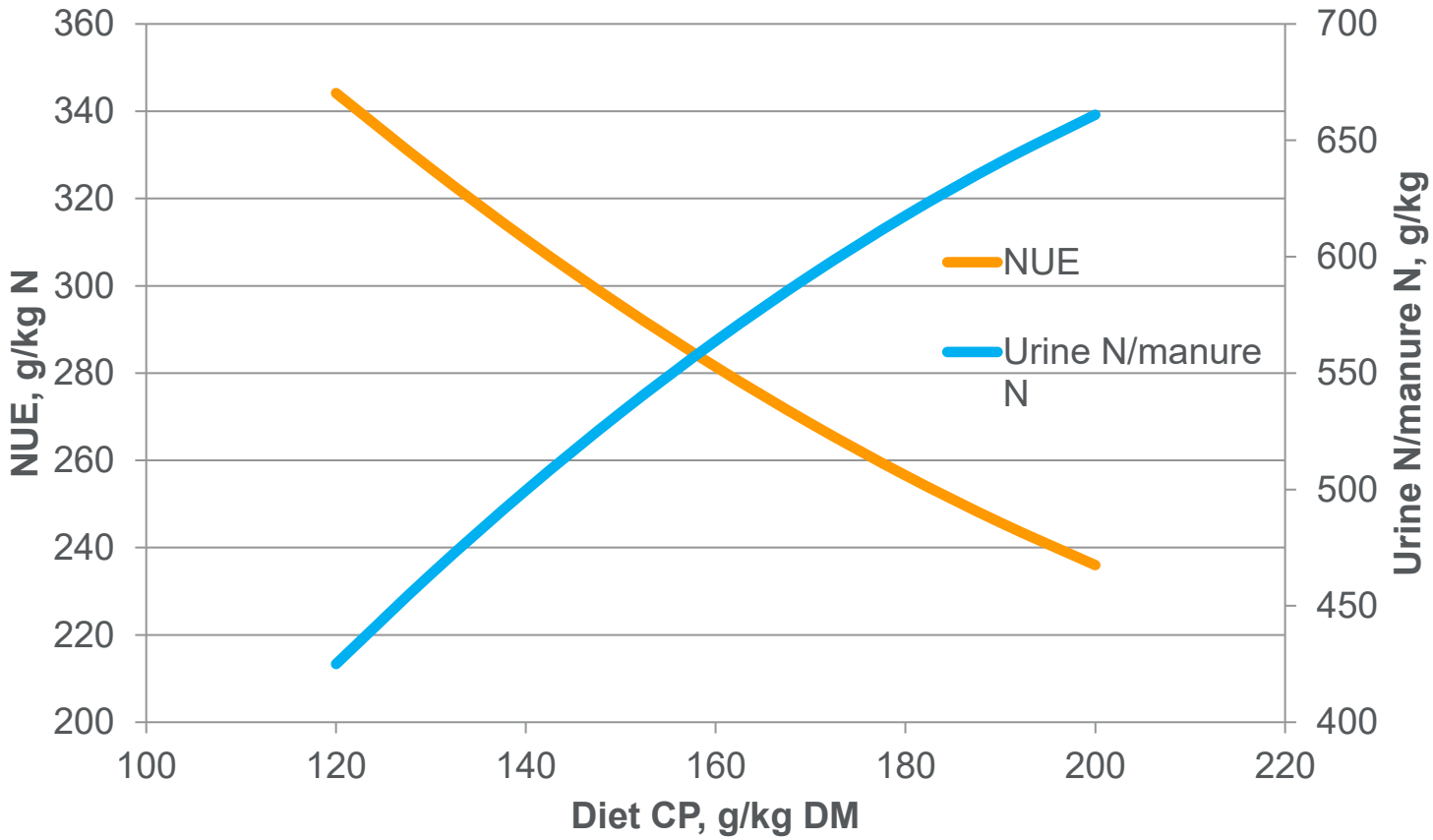


NHE = non-human-edible
HE = human-edible

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The single most efficient method to decrease the environmental load of nitrogen from ruminant systems is to decrease the N input in feeds



Huhtanen, P., Nousiainen, J.I., Rinne, M. Kytölä, K. & Khalili, H. 2008. Utilization and partition of dietary nitrogen in dairy cows fed grass silage-based diets. Journal of Dairy Science 91: 3589-3599.

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There are different options to be used as the basis of diet optimization regarding N / protein:

- Biological optimum
  - N requirements (relative to energy) of rumen microbes
  - Production resposes to absorbed amino acids
- Economic optimum
  - Feed protein is expensive but on the other hand it increases milk production
- Environmental optimum
  - Ammonia – air quality
  - Nitrous oxide – climate change
  - Nitrogen leaching – surface and ground water quality
  - Political restrictions, agri-environmental programs

- Typically they result in different levels of N input
  - Environment < Biology < Economy

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What about more innovative options to provide protein for livestock – or even humans?

- Many possibilities are already currently biologically and technically feasible, but not economically competitive
- The situation may change even quite quickly - crises?

- By-products currently in good use, but new ones keep emerging
- Biorefined grass / other biomasses
- Seaweeds, micro-algae
- Single-cell protein
- Insects, larvae
- Et cetera…







We need all sustainable options into use!

Photos: Marketta Rinne / Luke

Kiitos!

☺

Tack så mycket!

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