

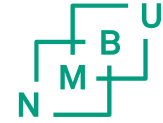
Strategies for improving productivity in small ruminants

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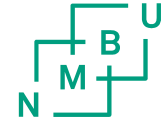


Strategies for improving productivity in small ruminants



strategies -> choose, improving -> better (for whom?)

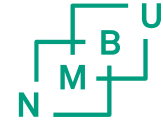
- Intro (Trends in Norway – and elsewhere?)
- Focus: **productivity = product / resource**
- Future
 - prices .. market
- Small ruminants and breeding
 - g * e? – need for different breeding goals?



Trends in Norway

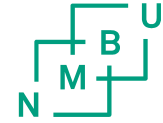
Rangeland exploitation by ruminants: diminishing status

- Viking times and before: free men guard flocks
- Later: slaves guarded the flocks
- Last centuries: children tended the flocks
- Recently: nobody guarded the flocks daily
- Today: less grazing of mountain rangeland.
 - More feed (grass) available near farms.
 - Imported grain / concentrates is so cheap that the mountain rangeland resource is not fully exploited



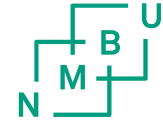
Times change

- Status and value of small ruminants change
- Will production potential of rangeland be needed and have a high enough value to be used by small ruminants in the future?
- With high salaries, and comparatively low prices of oil, fertilizer and grain on the world market, maybe not!
 - or lambs meat and goat cheese is valued for taste and origin (not only for food value)



- Farmers in Norway have loved the break that going into the mountains to check sheep gave during the summer
- Some young farmers today consider this a job they should get pay for and would and can rather go to Greece on holiday
- Farmers kept slimmer before...
- What we want and what we need is not necessarily the same.

Will rangeland resources be needed?



With growing world population and limited arable land ..

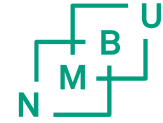
EITHER:

- 1) Price increase in world markets for oil, fertilizer, grains?

OR:

- 2) Productivity and efficiency keeps up with growing world population and salaries (in Norway..) remain high

What kind of sheep / goat do we need?



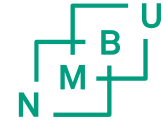
EITHER

- 1) Efficient transformers of rangeland feeds

OR

- 2) Efficient transformers of concentrated feeds

Norwegian White Sheep – a successful breeding story

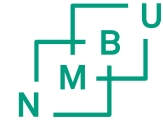


- Lamb at one year old
- Get more than 2 lambs per lambing
- Grow fast during summer

- Require intensive feeding
 - good spring pastures
 - good summer (mountain) pastures
 - made for efficient use of imported feed

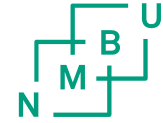
National breeding scheme – same for all environments

How would they do on extensive feeding?

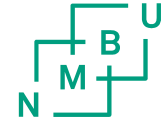


– without extra concentrates –

- I don't think we know



- How free is the market? Who decides what to produce?
- With <50% income tax a lot of market is decided by government
- Lamb meat and goat cheese produced with subsidies or for high end markets



Productivity

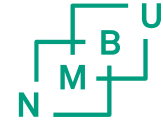
Google:

«**Productivity** is the ratio of output to inputs in production»

<<http://en.wikipedia.org/wiki/Productivity>>

Output ... It is national output that makes a country rich, not large amounts of money. [3]

<[http://en.wikipedia.org/wiki/Output_\(economics\)](http://en.wikipedia.org/wiki/Output_(economics))>



Output

for small ruminant production

- Meat
- Milk
- Landscaping
- ... Cultural heritage ...

Meat and milk output is relatively easy to measure



Input

for small ruminant production

- Feed
 - Amount / – Quality / – Seasonal availability
- Labor
- Shelter
 - Heat / – Cold / – Predators / – Control
- Care
 - Health / – Medicine / – Vaccines / – Lambing

Many inputs are difficult to quantify

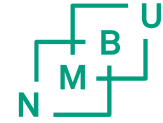


Animal husbandry – why?

Domestic animal:

- man supplies resources to get a product that man wants
- man exploits animal
- Chose animal according production (milk, meat, ..), - and according to available resource (feed, ..)
- But also give and improve resource according to animal (shelter, more concentrated feed, vaccines, ..)
- –....

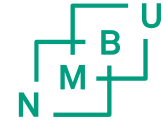
Resources for input – before studying productivity..



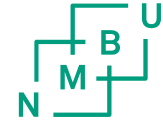
- We keep domestic animals to have better human use of **resources**
- Norwegian rangeland – 80% of surface – nice to walk in, but hard to eat for humans
- Ruminants can transform rangeland plant production to meat and milk
 - (photosynthesis etc ... - original resources)

A pig or chicken could hardly help us make human food out of the rangeland resource

Unlimited and limiting resources in production



- «Best things in life are ‘free’» or almost **unlimited**:
 - Air
 - Water (in Norway)
 - Life (?animal genetic resources)
 - Sun -> photosynthesis (finite on Earth and per Ha)
- But some resources cost and are **limiting**:
 - Labor
 - Feeds
 - Medicine
 - Shelter

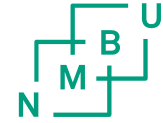


Productivity in many ways

- Protein productivity = protein output / protein input
- or protein output / area
- or protein output / labor

- Energy productivity
- Amount of human food / Area = [Land Use Ratio (LUR)]⁻¹

- Product per Pollution
- Product per Feed
- Product per Imported feed unit



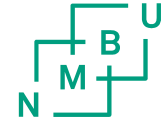
Productivity and price

productivity = output product / input resource
=?

economic productivity = price*product / price*resource

- price: availability and how people value and are willing to pay (market)
 - varies geographically and in time – **Future prices?**

A farmer can only produce if he is economic productive ie output / labor is reasonable

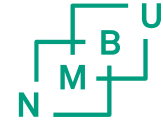


Prices and value

Money is used to measure what we value :
want / need / can afford

«Best things in life are free» and many cannot be bought (but some cost)
life / family / friends / air / daylight / ..

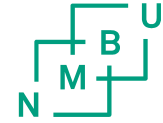
We need to eat less and use more energy, but increase productivity and do the opposite!



Product and price

- Market
 - supply and demand
 - alternative goods
 - (meat from chicken, beef, lamb, vegetarian alternatives, ...)
- What we need and what we want
 - what we should want (climate change, obesity, ..)

Why do we value lamb's meat and goat cheese?



Future, past, and policy today

- FAO tells us that food is getting scarcer
 - in 2005:
population increase > food production increase
- Climate change due to gases
- 1960-70s:
 - Reidar Borgström (1912-1990): Mat för miljarder (Food for billions)
 - Nobel peace prize for Green Revolution to Norman Borlaug
 - Framtida i Våre Hender - Erik Damman
- Green parties in EU and in Norway
- Thomas Piketty (2013): *Le Capital au XXIe siècle. Seuil.*



Money rules – mostly ...

- I will buy where I think I get best value for my money when I purchase food
 - lamb, porc, ..
- A farmer will change from sheep to pig production to get higher income
- or find another job in the oil industry...

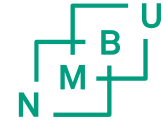
- Policy is more efficient if prices reflect policies
 - Greenhouse gas emissions should be taxed
 - Fossil fuel production and use
 - ~~Food prices will increase with shortage?~~



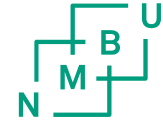
Small ruminant productivity

- Some resources are best refined by small ruminants
 - some rangeland pastures
- Some products are most efficiently made by small ruminants
 - landscaping by keeping down bushes

Genotype * environment interaction?

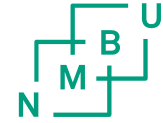


- Do we know when another breed is needed – when environments are so different ... ?
- We have bred for an environment where concentrates are available and cheap
- Do we need breeds for a future where food and concentrate feed are scarce?



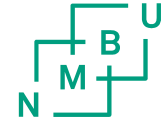
Small ruminants

- Require less investments
 - number of goats has been doubled in some countries (not Norway and Europe) after 1995
- Adapted to many environments
- Meat, milk, and fiber
- Labor intensive?



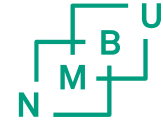
Survival and mortality

- A dead goat does not give milk
- A sick goat gives less milk
- The animal we need supports the environment we have and can give it.
- Mortality or survival is often an important part of productivity
- genotype * environment effects for mortality and survival
 - important ! / – difficult to breed for ?
- Animal welfare



Breeding for productivity

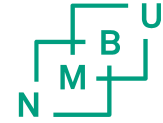
- Should breeding increase productivity for the limiting resources
 - or for the abundant / free resources?
 - imported feeds
 - or abundant rangeland?



Conclusion for food scarcity

- Feed that can be used for food should be used for direct human consumption
- Resources that ruminants can use, and not humans, should be transformed to milk and meat.
- Ruminants' role in a future with less food is to use less grains and more roughage
- If output product is measured per animal, then include the weight of the animal as a simple measure for input resource needed to increase productivity.

Conclusions with cheap imported feed resources



compared to salaries:

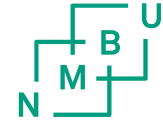
- Chicken and pork meat is cheaper to produce.

If lambs meat and goat cheese is desired:

- subsidize farmers to use the 80% rangeland resource
- and/or exploit high end market

Norwegian settings – but not irrelevant for other countries?

Conclusion with cheap imported feed resources



- Let ruminants be ruminants – transforming feed resources inedible for humans to highvalued milk and meat
- Go for high labor productivity:
 - easy-care animals: less disease, less kidding/lambing difficulties, easy to gather from rangeland pasture
 - more product (milk, meat, ..) per labor (and other limited resource)
 - **add grown weight to registrations – to limit increase in body size**

