Strategies for improving productivity in small ruminants

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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)>

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**