Why fatten cattle and buffaloes?

- Buyers/Traders pay more for animals in good body condition
- Reproductive performance increases as well as ability to rear calf
- Draught power of animals increases
- Better efficiency and more money for farmer
**How to do fattening?**

1: Plant & maintain forages
2: Feed and water troughs
3: De-worm and vaccinate
4: Ad libitum feed and water
5: Smart feeding
6: Other things

**How much grass do I need?**

- Enough so there is always feed left in the trough
- For growing and fattening cattle and buffalo, they require at least 15% of their weight every day
- A 200kg bull will eat at least 30kg of fresh, good-quality feed per day
- Remember – some is lost due to spillage (as much as 25%).
- To produce enough feed to fatten one adult bull requires 800 - 1,000 m² of grasses.

**How much water do I need?**

- Cattle and buffalo need water to digest feed efficiently
- Without water they eat less feed than is needed for good growth
- Fresh, clean water has to be available in the pen all the time
- The amount of water needed is related to animal size
- Cattle and buffalo drink at least 10% of their body weight each day.
  - a 200kg bull will drink about 20 litres per day - more than two full buckets of water.
- Animals need more when it is very hot and when they get a lot of dry feed

**Animal Health**

- If animals get diseases, success of fattening will be reduced
- Reduce disease risk by:
  - Good hygiene
  - Good biosecurity
  - Disease prevention: vaccination,
  - Disease treatment: de-worming
  - Disease reporting and investigation
Smart feeding

- Once cattle and buffalo have as much feed as they can eat, the next step is to improve the **quality** of the feed given to the animals to ensure they grow as fast as possible.

Why is feeding young, leafy grass important?

- Young grass contains many nutrients
  - are easy to eat and digest
- Older grasses contain fewer nutrients and become harder to digest
- Animals can only eat a small amount of old grass

Smart feeding

- Feed for growth-not maintenance
- Giving animals as much feed as they can eat is first step for fattening
- Leaf is good feed-stems are poor feed
- The more leaf the better is the quality of feed

<table>
<thead>
<tr>
<th>If you feed your animals forages that are...</th>
<th>mainly old grass (leaf and stem)</th>
<th>mainly young grass (leaf and stem)</th>
<th>mainly young grass and legume (leaves only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed quality</td>
<td>low</td>
<td>medium</td>
<td>high</td>
</tr>
<tr>
<td>Digestibility of feed</td>
<td>low</td>
<td>moderate</td>
<td>high</td>
</tr>
<tr>
<td>Breakdown rate in the rumen</td>
<td>slow</td>
<td>moderate</td>
<td>fast</td>
</tr>
<tr>
<td>Daily DM feed intake as % of body weight</td>
<td>less than 1.5%</td>
<td>1.5% - 2.5%</td>
<td>2.5% - 3.5%</td>
</tr>
<tr>
<td>which will give...</td>
<td>POOR animal production</td>
<td>MODERATE animal production</td>
<td>GOOD animal production</td>
</tr>
</tbody>
</table>
Cut actively growing young forage with a high leaf to stem ratio. A mix of grasses and legumes will assist growth and muscle development.

Make sure the forage is weighed before cutting and put into bags. A 200kg animal will require 30kg silage/day for fattening.
### VLA on fattening cattle – Methodology

#### Forage 4 Beef VLA on fattening cattle
- **VLA on fattening in Tbong Khmum**
- **From 05 August to 05 December 2009: 4 months**

<table>
<thead>
<tr>
<th>Feed group</th>
<th>Cattle number</th>
<th>Daily feed intake (Kg)</th>
<th>Water intake (L)</th>
<th>Condition score change</th>
<th>Weight change</th>
<th>Price change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grass</td>
<td>Legume</td>
<td>Rice straw</td>
<td>Total feed</td>
<td>Start</td>
<td>Finish</td>
</tr>
<tr>
<td>G1 No.1</td>
<td>15.4</td>
<td>3.9</td>
<td>0</td>
<td>19.3</td>
<td>11</td>
<td>1.5</td>
</tr>
<tr>
<td>No. 2</td>
<td>13.9</td>
<td>3.5</td>
<td>0</td>
<td>17.4</td>
<td>12.3</td>
<td>1.5</td>
</tr>
<tr>
<td>G2 No.1</td>
<td>16.1</td>
<td>0</td>
<td>3.2</td>
<td>19.4</td>
<td>12.5</td>
<td>1</td>
</tr>
<tr>
<td>No. 2</td>
<td>15.5</td>
<td>0</td>
<td>3.1</td>
<td>18.6</td>
<td>15</td>
<td>1.5</td>
</tr>
<tr>
<td>G3 No. 1</td>
<td>Free grazing 5 hours/day</td>
<td>1</td>
<td>1.5</td>
<td>151</td>
<td>169</td>
<td>600,000</td>
</tr>
<tr>
<td>No. 2</td>
<td>Free grazing 5 hours/day</td>
<td>1.5</td>
<td>2</td>
<td>225</td>
<td>256</td>
<td>1,100,000</td>
</tr>
</tbody>
</table>

### VLA on fattening cattle - Results

### Other things

- Fattening strategies e.g. pens
- Marketing
  - work as group
  - establish links with traders/buyers
- Timing
  - plan to match feed availability with production goal
  - = reduced costs and risks
Introduction

- The digestive system allows nutrients to be absorbed and used by the animal
  - food is broken down to very simple molecules.
  - resulting sugars, amino acids, fatty acids, etc. are then transported across the wall of the GI tract into blood.

- The specific foodstuffs animals utilise is dependent on their digestive system.

Three (3) basic types of digestive systems:

- **Monogastric** – simple stomach.
- **Ruminant** – multi-compartmented stomach.
- **Hind gut** – simple stomach, but very large and complex large intestine.
Rumen physiology

- mouth
- oesophagus
- rumen
- reticulum
- omasum
- abomasum
- small intestine
- large intestine

- Mouth:
  - Reduces food size (chewing)

- Oesophagus:
  - Transport to stomach (swallowing)
  - Regurgitation (cud-chewing)

- Mouth, esophagus, liver, pancreas, gall bladder, small intestine, and large intestine have functions similar to monogastrics.

- **Stomach**
  - Structure and function of stomach is major difference between monogastrics and ruminants.
  - Multi-compartmented stomach – rumen, reticulum, omasum, abomasum.
Parts of the Ruminant Stomach

- **Rumen:**
  - Large, anaerobic fermentation vat.

**Rumen Capacity**

<table>
<thead>
<tr>
<th>Species</th>
<th>Normal capacity</th>
<th>Maximum capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow (450 kg)</td>
<td>95-114 litres</td>
<td>210-230 litres</td>
</tr>
<tr>
<td>Ewe (68 kg)</td>
<td>11-19 litres</td>
<td>20-40 litres</td>
</tr>
</tbody>
</table>

- **Rumen**
  - large fermentation vat
  - ideal for microbial growth
  - covered with papillae to increase the surface area and allow nutrients to be absorbed
  - microorganisms
    - digest cellulose
    - synthesize amino acids from nonprotein nitrogen
    - synthesize B-complex vitamins

- Houses microorganisms.
  - Protozoa – 100,000 per gram of rumen fluid.
  - Bacteria/fungi – 100 million per gram of rumen fluid.

- Functions of microorganisms.
  - Digest roughages to make Volatile Fatty Acids (VFA’s), make microbial protein, and make vitamins K and B-complex.

- VFA’s absorbed in rumen.

- Lined with millions of papillae (short projections on wall of rumen) needed for absorption.
• Ruminants eat forage rapidly
  – they regurgitate food (cud)
  – and chew it again and swallow
• Rumination - continuous regurgitation, chewing, adding saliva and swallowing
• Eructation - elimination of gases (methane and carbon dioxide) in the rumen from fermentation

Rumen Microorganisms

• Bacteria and Protozoa
  – rumen environment is moist, warm, and provides a constant supply of nutrients
  – entire population of organisms depending on the kind and quality of the feed
  – when they are washed out of the omasum into the abomasum the acidic environment kills the microorganisms
  – provide amino acids and some energy

Ruminant Digestion

• Ruminants do not secrete amylase in their saliva
• bacteria and protozoa in the rumen and reticulum utilize starches and sugars- no glucose available for the ruminant
  – microorganisms do produce volatile fatty acids (VFA) that are absorbed and converted to energy
    • acetic, propionic and butyric acids
    • major source of energy

Reticulum:

• Contains microorganisms (like the rumen).
• Provides additional area for fermentation.
• As microbial fermentation proceeds, smaller and more dense material is pushed into the reticulum and ejected into the omasum along with microbe-laden liquid.
• **Reticulum**
  – lining looks like a honeycomb
  – involved in bolus formation for regurgitation
  – directs food of appropriate particle size into rumen
  – interacts with rumen to mix contents
  – traps foreign material (nails, wire, etc.)

• **Omasum:**
  – A heavy, hard organ with a lining that has many folds (leaves).
  – regulates flow from rumen to abomasum
  – Function not well understood.
    – Believed to produce a grinding action on foodstuffs to reduce particle size.
    – May absorb residual VFA’s, water and bicarbonate.

• **Abomasum:**
  – The true, glandular stomach.
    – Secretes acids and enzymes and functions very similarly to monogastric stomach.
  – Unique feature is that it secretes lysozyme.
    – Enzyme that efficiently breaks down bacterial cell walls.
    – Needed to break down the large quantities of bacteria that pass from the rumen.
Energy Pathways in the Ruminant

From Rumen to Abomasum

Injection materials

- Cellulose
- Starch
- Fat
- Complex Sugars
- Glucose
- VFAs

Ruminant Absorption
- in the small intestine
  - passive transport
    - diffusion by concentration
  - active transport
    - villi engulf molecules
      - to bloodstream or lymph system

Rumen Function
  - desire maximum microbial growth, survival and activity
  - important to address factors affecting rumination
    - order in which ration is fed
    - particle size of ration
    - number of times ration is fed per day
    - type of ration fed
  - will influence rumen pH

Rumen pH
  - desire pH range of 5.8 – 6.4
  - factors affecting rumination will affect saliva production and influence rumen pH
  - microbes that breakdown fibre prefer a pH range of 6.2 – 6.8
  - microbes that breakdown starch prefer a pH range of 5.2 – 6.0
Order in which ration is fed

- influences DM intake
- fed in sequence to optimise rumen function

Particle size of ration

- stimulates increased:
  - bolus formation
  - chewing
  - saliva production
  - buffering
- all forage must be > 11mm, only 10% > 40mm

Number of times ration is fed per day

- feeding more than once per day stimulates saliva production and buffering
- assists in maintaining a stable rumen pH

Type of ration fed

- high roughage vs high concentrate
  (rumen pH 6.5) (rumen pH 5.5)
- acidic conditions in rumen damage the papillae and reduce absorption of VFAs
Volatile fatty acids (VFA’s)

• primary VFA’s
  – acetic acid (acetate)
  – propionic acid (propionate)
  – butyric acid (butyrate)
• waste products of anaerobic microbial metabolism
• important energy substrate for host animal
• comparable to the role of glucose in omnivorous monogastrics

Summary

• when feeding a ration consider:
  – DM intake
  – fibre content (digestibility and particle size)
  – feeding sequence to optimise rumen function
  – type and quantity of components

• this will ensure optimal:
  – saliva production
  – pH
  – microbial growth
  – VFA production
  – microbial protein synthesis

• and lead to improved:
  – production
  – reproduction
  – cow health
  – efficiency