Review on Optimum Feeding Levels to maximize Beef Production
- Case Study with Egyptian Water Buffaloes -

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비육우 적정 사료 급여수준 연구
- 이집트 물소를 중심으로 -
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ABSTRACT: This study reviewed optimum feed intake levels to maximize beef production in Egypt. To achieve maximum beef production efficiency, feeding system during growing period is very important because reticulo-rumen rapidly develops at this time. It is necessary to supply good quality roughage and concentrate diets until the calves reach 12 months of age. Also restricted feeding of concentrate diets from weaning to yearling is required to make calves to intake enough good quality of roughage. Size and microbial eco-environment of the rumen development depends on the physical structure of the roughage. After the rumen became mature, it's microbes require certain amount of roughage in the diet to maintain their survival such as pH. However, when only concentrate diets are given, ruminal pH drops to acidic condition and there may occur an abnormal physiological condition, so called, acidosis, which, in acute case, may cause death of the animal. Acidosis can lead to many secondary problems including bloat, low milk components (especially milk fat), reduced DM intake, displaced abomasum, reduced immunity, poor milk production, and so on. Water is the medium in which all chemical reactions in the body take place. Blood, which contains 80% water, is vital in transporting oxygen to the tissues and carbon dioxide from the tissues. Therefore, for the optimum strategy to maximize beef production in Egypt, more specified researches on feeding strategies, such as use of concentrates, way to increase feed intake levels, control of dry matter intake, the other factors affecting feed intake or drinking water quality should be made.

Keywords: feed intakes, beef cattle, roughage, production, egypt

This review summarized an optimum strategy to maximize Egyptian water buffalo beef production that was discussed in Animal Production and Health meeting for Livestock specialist in Asia and Africa in 2006. During a strategy meeting in Animal Production and Health meeting, we investigated an optimum feed intakes for maximizing Egyptian water buffalo beef production. Water buffaloes are ruminants. They have complex stomach structure consisting of four parts (rumen, reticulum, omasum and abomasum). In the young ruminant, the first two of these form a large compartment and together account for more than 60 per cent of the total size of the stomach and have a capacity of about 120L. This reticulo-rumen maintains a constant temperature about 39 to 40°C. In this review, we describe the following problems: What is the optimum feed intake levels for maximum beef production in Egypt? How do buffalo farmers feed concentrate diets in combination with roughage? How do they increase feed intake levels while they are controlling dry matter intake? What are the other factors affecting feed intake and what is the role of water?
MATERIALS AND METHODS

Statistics for meat production in Egypt

Governmental program to develop livestock industry in Egypt started in early 1980's mainly to improve local food supply chain. Most Egyptians refuse to eat pork because of their religious regulation. In Egypt cultivated grassland is limited. Therefore, poultry is very important source of meat in the livestock industry as is found in Table 1. Water buffalo growth is limited about 20.9%, but which is the second most. Most farmers raise Holstein bulls and water buffaloes together. Consumers' third choice is the meat from calf and beef cattle (18.5%). Meats from sheep and goat (8.1%), from camel (2.5%) and from other animals (5.7%) take up the rest of consumers' choice. This study was conducted to investigate optimum feed intake for maximum beef production in Egypt.

<table>
<thead>
<tr>
<th>Item</th>
<th>Poultry</th>
<th>Water buffalo</th>
<th>Calf</th>
<th>Beef cattle</th>
<th>Sheep</th>
<th>Goat</th>
<th>Camel</th>
<th>Pig</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>44.3</td>
<td>20.9</td>
<td>18.5</td>
<td>8.1</td>
<td>2.5</td>
<td>0.2</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.46M/7

Million tons.

RESULTS AND DISCUSSION

Optimum feed intake for buffalo in Egypt

First, after restricted feeding of concentrates in the amount of about 1-1.5% of body weight, depending on conditions of the buffalo, the farmers may want to increase the amount of concentrates slowly and maintain daily gain over 1.2 kg during fattening. During fattening period, body weight growth will be faster because of possible compensatory growth (Linn et al. 1987) following restricted feeding of concentrates at growing stage. The degree of compensatory growth would be affected by various factors, such as the nature, severity and duration of undernutrition or the pattern of subsequent feeding. Start the cattle on roughage only for two days. The proportion of grain in the ration is then gradually increased over a number of days. Common practice is to increase the grain level to about 40 or 50% of the ration, and hold at that level for a few weeks. Then increase the grain again to 70 or 80% for the finishing phase. It is important to observe the cattle closely as the grain level is increased. If there are any signs of digestive problems, the grain level should be held constant or even decreased. Severely affected cattle should be taken to a separate area and fed roughage only. Hay or silage can be used as the roughage source. Silage is ideal because it improves the palatability of the ration. Poor quality roughage, such as straw, can provide up to half of the roughage component of the ration. There are commercial mineral/vitamin premixes available for adding to feedlot rations. These may contain calcium, urea, sulphur, salt and various trace minerals and vitamins. They are usually included at 1 to 5% of the total ration. To achieve satisfactory growth rates, the ration should have an overall level of 13% crude protein. If the roughage and/or grain used is low in protein (say the roughage has less than 8% and the grain less than 11% crude protein), then some natural protein should be included in the ration. Lupins, peas, sunflower meal, safflower meal, linseed meal, and soybean meal can be used probably at about 5% of the total ration.

How do they increase feed intake levels while they are controlling dry matter intake?

The second is to control dry matter intake. Dry matter intake (DMI) is the sum of the dry matter weights of all the feedstuffs consumed by the animal. Intake, more than any other variable, determines the success or failure of the feeding program. Many factors influence the DMI of high producers (Davis et al 1983). Those commonly observed are body weight, health of cows, level of milk production, climate, frequency of feeding, ration balance and palatability of the ration. The DMI for high producers varies according to type of ration and can range from 2.5 to 5 lb of dry matter per 100 pounds body weight (Davis et al 1983). DMI has a major impact on producer profitability and producer satisfaction with the feeding program. DMI is influenced by many factors including bunk management, forage quality, moisture content of the diet, presence of mold and rumen health (Bray et al 1990). Bunk management plays a major role in determining dry matter intake. A readily accessible feed bunk always containing fresh feed is the optimum situation. It is always a good idea to observe the cattle and the bunk. Feed not consumed within 24 hours should be removed from the bunk and replaced with fresh feed. Forage quality also has a marked effect on DMI. As forages mature, the proportion of stem or fibrous portion of the plant increases. The fibrous stem is digested at a slower rate than the leafy part of the plant. Moderate moisture content generally makes feeds more palatable and may increase DMI. Excessive moisture may depress DMI. Molds and mycotoxins have a variety of effects on ruminant animals. When investigating sub-optimal DMI, always check for mold at the source of each feedstuff. Mold can be difficult to find in the finished ration. Rumen health is also a determinant of dry matter intake. A healthy, actively fermenting rumen environment will digest feeds faster and lead to an optimum