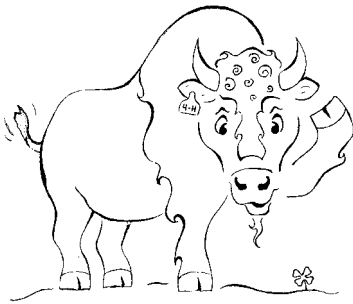
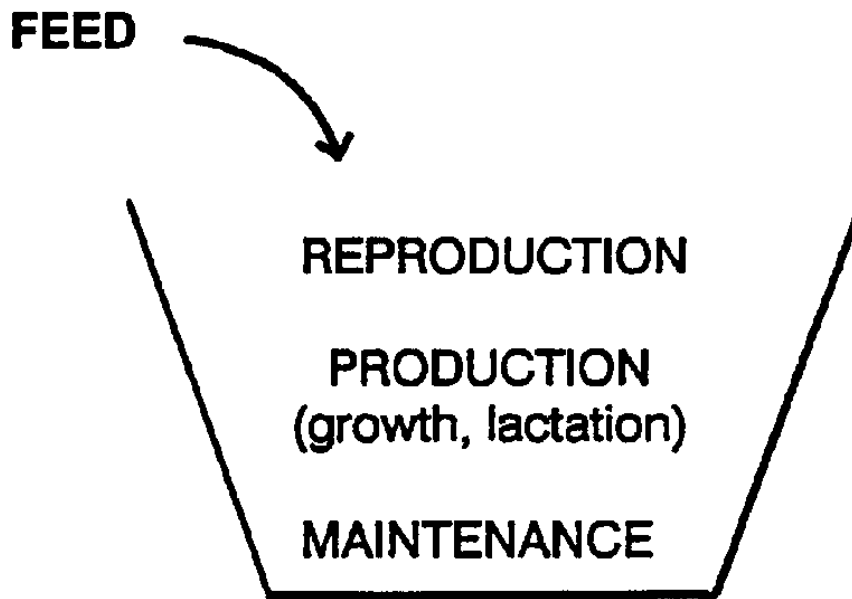


Digestion of the Bison



Roll Call:

Because the stomachs of the ruminant and monogastric animals are so different, their diets also vary. Let's compare the diets. Tell me what foods each of these animals would eat in a normal day.



A monogastric - You

A ruminant - Bison

What is a ruminant?

A ruminant animal has a stomach with four distinct rooms or compartments. Each of these compartments has its own special job to do in the digestion of food.

What is a monogastric?

A monogastric animal has a stomach with one big compartment. All the digestion work is done in this one big room. Here is an easy way to remember this:

mono (one)
gastric (stomach)

What a difference there is in the foods you two eat? The reason these diets are so very different is that each of these stomachs have very different abilities to digest food.

Describe the major difference between monogastrics and ruminants. (If you are stuck look above for the answer!!)

What is digestion?

Digestion is the preparation of food for absorption.

Before your body can use those things in the foods, your stomach must digest them so that you can absorb them. The digestive system does this by breaking the food down into tiny bits, and then breaking them down even further so they can be absorbed into the body parts.

What is the digestive system?

The digestive system is made up of all the parts of the body that have a job to do in the process of digestion. The digestive system of a bison is smaller than that of a beef animal, but they are believed to be very similar in physical appearance. However, because the bison is native to this country, they can actually digest foods a little differently than domestic beef cattle.

Let's look at each of the parts of the digestive system and the jobs they have to do. Then, we can figure out why the digestive system in the bison is unique to other livestock.

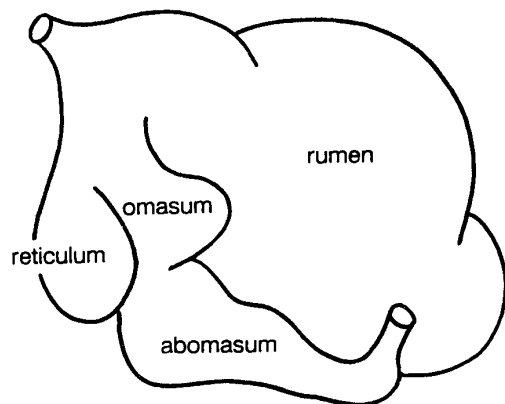
The parts of the digestive system in the ruminant are

The **mouth** takes the food into the body. The food is broken up into smaller bits by the chewing and grinding of the teeth. Saliva from the mouth helps to break the food down more. The saliva contains enzymes that start to breakdown the food.

The **esophagus** is the long tube or tunnel that runs from the mouth down to the stomach. When food is swallowed, it goes down the esophagus into the stomach.

The **stomach** of the bison has four distinct compartments. This is how we know that he or she is a ruminant animal. Each of these compartments has its own special job to do in digesting food.

This is what the stomach looks like:



Alberta 4-H Bison Project – Member Level One

The first part of the stomach the food enters is the **rumen**. This is the largest compartment. In the adult bison, the large size of this compartment allows the bison to hold feeds for long periods of time. The rumen mixes the food. Tiny microbes or microscopic "bugs" attack the food and help break it down. From the rumen, the food moves to the **reticulum**. The fine material is moved to the next compartment. The coarser food material is sent back up to the mouth for more chewing. This is called rumination or "chewing the cud".

Did you know? The average bison will spend between 7.5 and 9 hours a day "chewing its cud".
This is about 1/3 of its life!

The third compartment of the stomach is the **omasum**. There are two main purposes for the omasum. First it squeezes the fluids out of the food material and lowers the moisture content. Secondly, it is important in ruminant digestion because it keeps coarse material back for further digestion.

The fourth and last compartment of the stomach is the **abomasum**. It is also called the true stomach since it is very similar to the stomach of the human and other monogastric animals. The abomasum contains digestive juices that help to break down the food even more. In the newborn calf, the milk bypasses the first three stomach compartments and goes directly down the esophagus into the abomasum.

When the food moves out of the stomach, it no longer looks like the food which your animal ate. This food material goes from the stomach into the **small intestine** that is like a very long, thin, coiled tube. The small intestine contains a number of digestive juices. These juices help to change the food material to a form that the body can absorb.



Alberta 4-H Bison Project – Member Level One

Now, the material moves to the **large intestine**.

The large intestine is a shorter, fatter tube.

It absorbs what is left of the liquid in the material and adds mucus to help the material travel more easily.

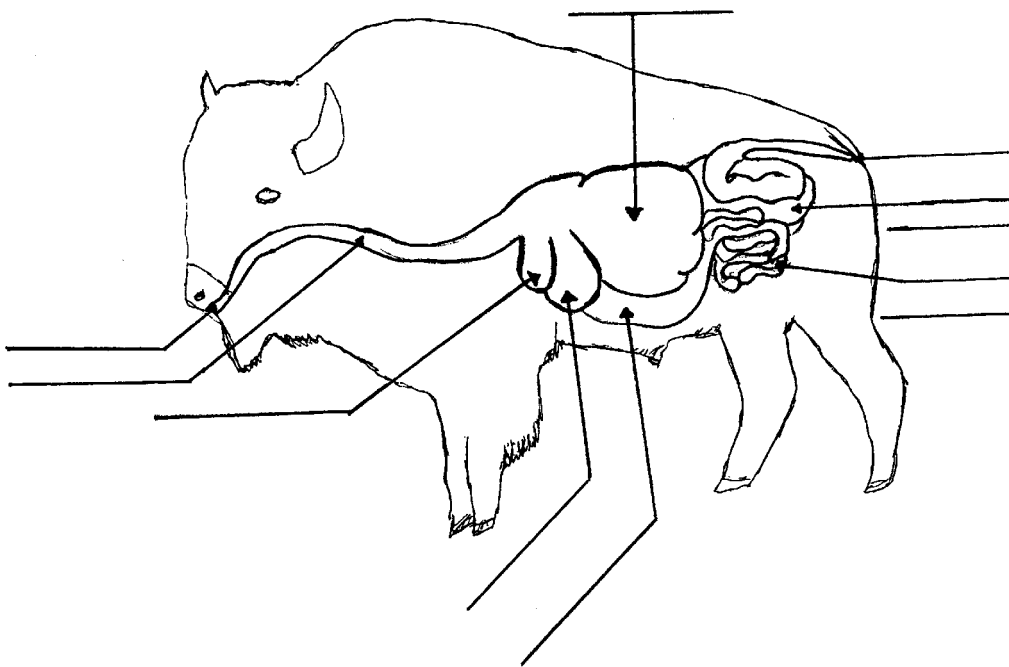


The final part of the digestive system is the **anus**. This is the opening in the body through which the waste material passes. This waste material is the remains or undigested food, which we refer to as manure.

WOW! Digestion is really complicated, isn't it? If any one part of this system is not working properly, the rest of the system cannot function and that can lead to real problems.

It is important that you understand how the bison, and other ruminants, can digest such different foods than you or any other monogastric animal. The bison's digestive system has the ability to turn feeds grown on poor quality land into a valuable product.

Label the path on the following diagram:



A word search puzzle

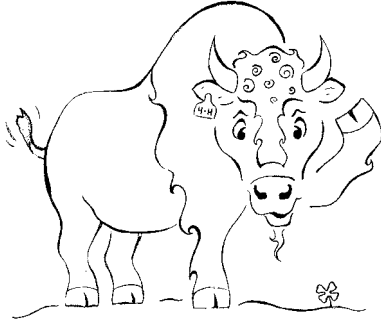


Find these digestion words in the puzzle below:

ABOMASUMS
ACTION
BISON
BUGS
COMPARTMENT
DIGESTION
FOLDS
INTESTINE
LARGE
MANYPLIES
MICROBES
MOUTH
RETICULUM
RUMEN
SMALL
STOMACH
SYSTEMS

I	E	I	F	B	A	D	O	C	S	B	M
N	S	O	O	I	R	I	O	O	S	T	A
T	T	A	L	S	H	G	N	M	N	R	O
E	O	C	D	O	N	E	U	E	O	E	S
S	M	T	S	N	M	S	M	S	M	T	S
T	A	I	H	U	A	T	B	M	O	I	Y
I	C	O	R	M	R	I	U	A	U	C	S
N	H	N	O	A	H	O	G	L	T	U	T
E	H	B	P	D	M	N	S	L	H	L	E
H	A	M	I	C	R	O	B	E	S	U	M
E	O	L	A	R	G	E	M	E	D	M	S
C	T	W	M	A	N	Y	P	L	I	E	S

Nutrient Requirements of the Bison



Roll Call:

Name a nutrient. _____

Name a feed item that is a good source of this nutrient. _____

What is a nutrient? - A nutrient is something needed for life.

A nutrient is needed for maintenance, growth and production, and reproduction.

Think of these levels as being in a pail. As you pour the balanced feed in, you first cover the maintenance portion of the pail, if you keep pouring you will have enough for the animal to grow. In order for the animal to maintain their body, grow or provide feed for an existing calf, or to reproduce you must provide the full amount she requires.

A nutrient is like an ingredient in a recipe. If we leave an ingredient out, the food we are preparing will not turn out properly. If we leave an ingredient out of the bison's diet, it will not grow up or produce as well as we expect.

If the animal does not receive enough of a nutrient, it is said to be deficient.

There are five nutrients the bison needs in its diet. Can you name them? (Hint: Read the chapter first and then answer this question!!)



Let's learn more about each of these.

Did you know? You need the same kinds of nutrients in your diet as the bison does in his or her diet.

Water

We don't often think of water as an important nutrient, but it is necessary for life.

How important is water? When a calf is born, water makes up 75 to 80 percent of its body weight.

Water does many things, it

- helps the body get rid of waste
- helps transport things through the body
- lubricates the joints
- helps in body activities
- helps keep the body healthy

The amount of water your animal needs depends on

- body size
- weight
- feed consumed
- the environment
- the type of animal

Water should be available for your animal at all times. In the winter time the bison will lick snow. Think of it as a bison snow cone from the local fair!

The first sign you will notice if your animal is not getting enough water is a decrease in feed intake.

Water quality is important for all livestock. An abundant supply of clean, fresh water should always be available for all your animals.

Energy

Energy is the power the animal needs for the body to function. It receives this power from the food it digests, or the "fuel" it "burns".

Like you, the bison needs energy for many reasons:

- to keep warm
- to grow
- to produce milk and calves
- to move around

Too much energy

You can tell if a bison is getting too much energy if it

- becomes too fat
- calving is difficult
- digestive system becomes upset
- lower resistance to disease
- lower fertility

Too little energy

It may be difficult to determine if your bison is not getting enough energy. Because of the survival nature of this animal, like other wild animals, they will first show this in the conception rates at breeding time. Therefore it is far more important to focus on prevention.

Bison not receiving enough energy may exhibit the following signs:

- reproductive problems
- slow or stopped, growth
- lower resistance to disease
- poor hair coat
- losing weight

From these problems, you can see the importance of providing a bison herd with the right amount of energy.

Protein

Protein is needed by the bison for

- growth
- reproduction
- muscle development and action
- hair growth
- milk production

Most feeds contain some protein. However, it is often only in small amounts. One of the best sources of protein is legume hay.

Vitamins

Vitamins are needed for these activities:

- growth
- reproduction
- movement
- to stay healthy



Vitamin	Source	Importance
A	- added to diet - green forage	- most important vitamin for bison - needed for vision, bone development, healthy skin and tissue, reproduction - content in feed declines as feed ages - forages contain carotenes which the body uses to make vitamin A - stored in the body up to six months
B	- made in rumen	- not stored in the body, water soluble - there are many B vitamins (riboflavin, thiamine, niacin and so on)
C	- made in body	- not stored in the body, water soluble - man can not make his own
D	- sunshine - sun-cured forages	- need for strong bones and growth - animals kept inside and fed silage may need Vitamin D supplements stored in the body, fat soluble
E	- green forages - whole grains	- works with selenium in muscle action stored in the body, fat soluble
K	- green forages - made in rumen	- needed for blood clotting - moldy sweet clover restricts K action stored in the body, fat soluble



Activity: Matching

How much do you know about vitamins?

Match up the vitamins on the left with its characteristic on the right.

Vitamin	Characteristic
A	ruminants manufacture this vitamin, but humans must receive it in their diet
B	needed along with the minerals calcium and phosphorus for healthy bones; known as "the sunshine vitamin"
C	vitamins in this category include niacin, riboflavin, thiamine and others
D	needed for proper blood clotting
E	a very important vitamin needed for vision, healthy skin, digestion and reproduction
K	needed along with the mineral selenium for muscle function

Minerals

Minerals are needed in the body to build healthy teeth and bones. They are also needed for other functions including the proper working of muscles and nerves.

There are at least 19 minerals required by the bison animal. Some of these are:

Macrominerals

*- those minerals required
in fairly large amounts*

Calcium
Phosphorus
Magnesium
Potassium
Sodium
Chlorine
Sulphur
Manganese

Microminerals

*- those minerals required
in smaller amounts*

Iodine
Cobalt
Selenium
Iron
Zinc
Copper
Molybdenum

Keyword:

To find the keyword, fill in the blanks in words 1 through 8 with the correct missing letters. Transfer those letters to the squares below.

--	--	--	--	--	--	--	--



1. ___ I T A L
2. B ___ S O N
3. N U ___ R I T I O N
4. ___ L B E R T A
5. ___ A R K E T
6. Z ___ N C
7. M I ___ E R A L
8. ___ T O M A C H



Alberta 4-H Bison Project – Member Level One

About salt

Type of Salt

White

Iodized (red)

Cobalt iodized (blue)

Trace mineralized

Minerals Contained

Sodium, chloride

Sodium, chloride, iodine

Sodium, chloride, iodine, cobalt

Sodium, chloride, iodine, cobalt, zinc, iron, manganese, copper, selenium

Nutrient summary

We have now learned a little about each of the nutrients that are required by bison. Answer the following questions to give you a summary of the information provided in this unit.

1. The five nutrients required by bison are

2. Why is water important for bison?

3. A good source of protein is _____.

Alberta 4-H Bison Project - Member Level One

4. Bison receive energy from digesting _____ and _____.

5. Choose the correct answer.

If a bison consumes extra energy, it will

a) become too fat

or

b) lose weight.

6. Why are vitamins needed by bison?

7. There are two types of minerals. These are the

_____ and _____.

An example of each of these types is _____ and

_____.

