# Exercise 2

**Feed Composition and Nutrient Requirements 15 Points**

The objective of this laboratory exercise is to familiarize the student with the feed composition and nutrient requirement tables in the textbook. These tables list the nutrient composition of the various feedstuffs and the nutrient requirements of the various livestock species. Some of the nutrient requirements are expressed in some tables as concentration of the nutrient required in the diet (i.e. as a percentage or Kcal/kg) and in other tables as an amount of nutrient required per day. As an example, Table 9.4 expresses requirements of breeding beef cattle as amounts (g of protein required per day) and as concentrations (percent of protein required in the diet dry matter).

It is important for the student to begin to understand trends in nutrient composition of feeds and nutrient requirements of animals. This information will become useful in subsequent exercises that involve ration formulation or the calculation of ingredient combinations which will meet the various nutrient needs of a particular livestock species.

For this exercise, show calculations for “Nutrient Requirements for Livestock” on a separate sheet of paper, as there is little space for calculations in the table.

Complete the following table of ***forage ingredients*** using the Table 3.2a Provide the as-fed DM value and the nutrients on a DM basis.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Feed ingredient | DM, % | Protein, % | Crude Fiber % | Ether Extract % | Acid Detergent fiber % |
| Alfalfa hay, early bloom |  |  |  |  |  |
| Alfalfa hay, mature |  |  |  |  |  |
| Alfalfa silage, Medicago Sativa |  |  |  |  |  |
| Timothy, fresh, late vegetative |  |  |  |  |  |
| Timothy, hay, late veg |  |  |  |  |  |
| Timothy, hay, mid bloom |  |  |  |  |  |
| Clover, Red, Hay, Sun-cured |  |  |  |  |  |
| Barley straw |  |  |  |  |  |
| Wheat straw |  |  |  |  |  |
| Rape, fresh |  |  |  |  |  |
| Wheatgrass, Grested, hay |  |  |  |  |  |

Complete the following table of ***concentrate ingredients*** using the composition tables. Provide the as-fed DM value and the nutrients on a DM basis. Use Table 3.2a unless otherwise indicated.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Ingredient | DM, % | CP, % | Crude Fiber % | Ether Extract % | Ash % |
| Bone meal |  |  |  |  |  |
| Meat With bone meal |  |  |  |  |  |
| Barley, grain |  |  |  |  |  |
| Barley, grain, Pacific Coast |  |  |  |  |  |
| Maize, ZEA MAYS, Grain |  |  |  |  |  |
| Cotton seeds, ground |  |  |  |  |  |
| Cottonseeds meal, solvent extracted  41% Protein |  |  |  |  |  |
| Fish meal, Menhaden, |  |  |  |  |  |
| Molasses, beet |  |  |  |  |  |
| Pea seeds |  |  |  |  |  |
| Oats, grain, Pacific Coast |  |  |  |  |  |
| Distillers Grains,dehydrated  (DDG) |  |  |  |  |  |
| Soybean meal, solvent extr. |  |  |  |  |  |
| Sorghum, Milo, Grain |  |  |  |  |  |
| Urea |  |  |  |  |  |

From the previous two pages list the two ingredients that have the highest and the two that have the lowest dry matter concentration content:

|  |  |
| --- | --- |
| Highest DM | Lowest DM |
|  |  |
|  |  |

List the two feed ingredients that have the highest and the two that have the lowest crude protein concentration (%):

|  |  |
| --- | --- |
| Highest CP | Lowest CP |
|  |  |
|  |  |

List the two feed ingredients that have the highest and the two that have the lowest crude fiber concentration (%):

|  |  |
| --- | --- |
| Highest CF | Lowest CF |
|  |  |
|  |  |

Comparing alfalfa (legume) to timothy (grass) hay which has the greater (compare early bloom alfalfa with late vegetative timothy so that comparisons are at comparable maturities):

DM:

CP:

CF:

EE:

ADF:

Of the components listed above (DM, CP, CF, EE, ADF), which increase with plant maturity?

Which components decrease with plant maturity?

Nutrient Requirements for Livestock

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Intake | ME | | CP | | Ca | |
|  | gram | Kcal/Kg | g/Kcal/day | % | g/day | % | g/day |
| **Swine Table 7.2a & 7.2e:** | | | | | | | |
| Growing pig, 10-20 kg |  |  |  |  |  |  |  |
| Growing pig, 80-120 kg |  |  |  |  |  |  |  |
| **Ewes Table 10.1:** | | | | | | | |
| First 15 wk gestation, 60kg |  |  |  |  |  |  |  |
| First 6-8 wk lactation--singles, 60kg |  |  |  |  |  |  |  |
| First 6-8 wk lactation—twins, 60kg |  |  |  |  |  |  |  |
| **Dairy Cows Table 9.5** | | | | | | | |
| 600 kg—late 2 months gestation,14 kg DMI |  |  |  |  |  |  |  |
| 600 kg--40 kg of 3.5% fat milk, 0.4 kg weight loss per day, 23 kg DM intake |  |  |  |  |  |  |  |
| **Beef Cows Table 8.2b & 8.2c** | | | | | | | |
|  | DMI | NEg | | CP | | Ca | |
|  | lbs | Mcal/lb | Mcal/day | % | lb/day | % | lb /day |
| 300 kg—1200@finishing 60%TDN |  |  |  |  |  |  |  |
| 880 lbs—1100@finishing 90% TDN |  |  |  |  |  |  |  |

**1 Mcal = 1,000 Kcal; 1 Kg = 1,000 g**