CAPRICORN

LEAST COST AND RATION ANALYSIS PROGRAMS FOR DAIRY AND MEAT GOATS VERSION NUMBER 2010

DEPARTMENT OF ANIMAL SCIENCE UNIVERSITY OF CALIFORNIA DAVIS

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Least Cost and Ration Analysis Programs for Dairy and Meat Goats
Version Number 2010
Regional Software Dissemination Site: USA

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How to Install?

1. Insert the CAPRICORN CD into the CD-Rom drive.
2. Using your Windows Explore, navigate to the CD and you will see a file called Setup.exe.
3. Double click Setup.exe. The Welcome dialog box appears. Click the Next button.
4. The License Agreement dialog box appears. Accept the terms in the license agreement and click the Next button.
5. The Customer Information dialog box appears. Enter your name and your organization and click the Next button.
6. The "Ready to Install the Program" dialog box appears. Click the Install button.
7. The wizard will install the CAPRICORN program on your computer. It may take SEVERAL minutes.
8. Finally, the final dialog box appears. Click the Finish button. The wizard finishes the installation and will place a shortcut to CAPRICORN on your desktop. It also adds the CAPRICORN to your program menu.
9. It will create a folder called "C:\ProgramFiles\UCDAVIS\CAPRICORN2010\" and will place the CAPRICORN.exe file plus the demo.cap ration file in that folder

CAPRICORN Files

All CAPRICORN files are stored in the following folder: C:\Program Files\UCDAVIS\CAPRICORN2010\ All CAPRICORN ration files have the .CAP extension and are stored, by default, in the above folder. There are four feed library files:

1. CAPSTD.DBF, standard feed library
2. CAPALT.DBF, alternate feed library
3. CAPGRP.DBF, feed group library
4. CAPINF.DBF, infeasible feed library.

These files are stored in the C:\Program Files\UCDAVIS\CAPRICORN2010\ folder. The CAPRICORN manual, Manual.pdf, is stored in the CAPRICORN folder. To view and print this file, you need Adobe Acrobat Reader. You can get a free copy of this software by visiting the following web site: http://www.adobe.com/products/acrobat/readstep2.html The CAPRICORN order form, OrderForm.pdf, is also in the same folder.

How to Run?

1. Click the Start button and then choose the "All Programs". A menu list appears.
2. Choose the "UCDAVIS" option. A sub-menu appears.
3. Choose the "CAPRICORN2010" option. Another sub-menu appears.
4. Choose the "Launch CAPRICORN" option. The sign-on banner of CAPRICORN appears. Click the OK button. The main menu of CAPRICORN appears.

Configuration and Customization

This program has two configuration files:

1. COMPANY.CFG: to configure the heading for all printouts.
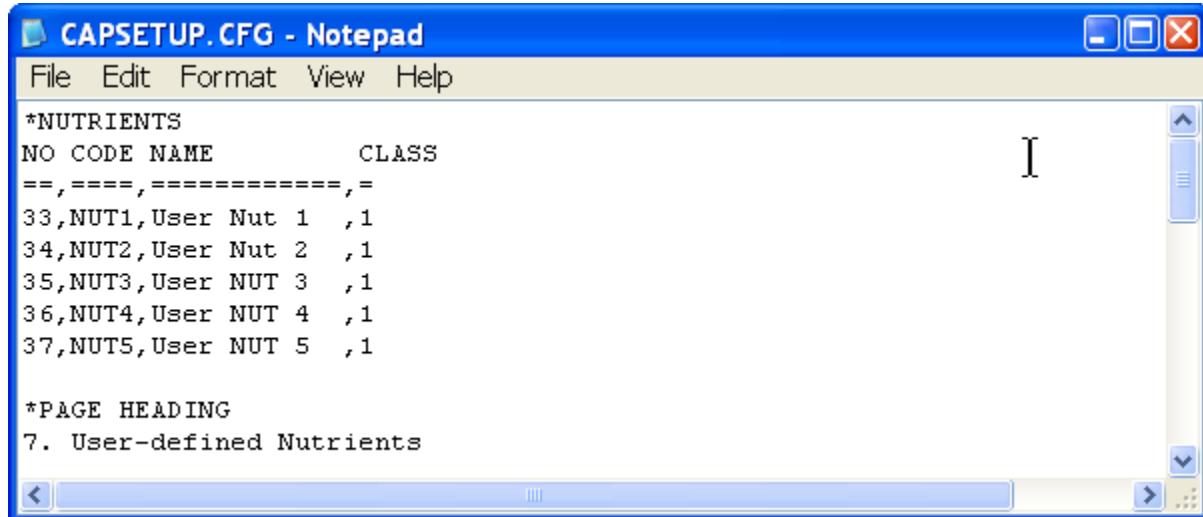2. CAPSETUP.CFG: to configure user-defined nutrients.

WARNING Please copy these files in another folder, such as C:\BACKUP\ as backup. This is very important. If you mess up any of these configuration files, you will be able to restore them by copying the configuration files from the backup folder onto the main folder for this application. DO NOT EDIT ANY OF THESE CONFIGURATION FILES WITHOUT MAKING BACKUPS!!!!!!

1. *Company.cfg*

Edit this file to configure the headings for all your printouts. This text file is located in the main folder for this application. Do not use Microsoft Word to open this file. Use Notepad program to edit it. This file has exactly four lines. Each line has exactly 78 characters. The first line shows the name of your company. The second line shows your address. The third line shows your phone, fax, email, and web address. The fourth line must be blank to keep a blank line between the heading and the body of printouts. Use space bar to center the text. Do not use tab. You must re-start the program for your modification to take effect.

2. *Capsetup.cfg*

Edit this file to configure user-defined nutrients. This text file is located in the main folder for this application. Do not use Microsoft Word to open this file. Use Notepad program to edit it. This file has three sections: NUTRIENTS, PAGE HEADING and INSTRUCTIONS. The Instructions section shows how to modify the other two sections. You must re-start the program for your modification to take effect.

Printouts

The program creates various text files for printouts. Although these are not used in configuration or customization of the program, but you can open them in your text editor and reformat and print them as you wish. These files will be constantly overwritten by the program, so save them under different names to keep them from being overwritten by the program. You can use a text editor, such as notepad or Microsoft word to open these text files. Please, Use "Courier New" font to keep the spacing and alignment. Do not use "Times New Roman" or "Arial" or any other font.

Printout for Ration Formulation and Evaluation

Each time you print the formulation or evaluation of a ration, the program creates a text file which contains the same information as in the printout. This text file is called PRINTOUT.TXT and is located in the main folder of the application.

Printout for Loading and Unloading

Each time you run the delivery module and print the output, the program creates a series of text files, which contain the same information as the printouts. These files are located in the main folder of the application.

HEADT.LST - This contains the loading or unloading heading. BODY.LST - This contains the loading or unloading printout

Animal Information Screen

This is a general help message for the animal information screen. Most of The following fields are common to all four modules, but some of the fields may be present in one module but not in others.

Ration Title

Enter a name and/or address or other identification for your ration on these two lines. The title will be displayed at the top of all printed output for this ration.

Unit of Measure

You may choose to enter data using either the English or the metric system. Select lb to display all input and output in English units. Select kg to display all input and output in metric units. The program will automatically convert any data already entered to the unit selected.

Body Weight

Enter the average weight of the group of goats for which this ration is being formulated. Normal range for pre-weaning kids is 4-22 lb (2-10 kg). Normal range for growing kids is 22-31 lb (10-40 kg). Normal range for mature does is 40-190 lb (18-86 kg). Normal range for mature bucks is 50-300 lb (22-136 kg).

Mature Weight

Normal range for females is 40-190 lb (18-86 kg) and for males is 50-300 lb (22-136 kg).

Body Weight Gain

Enter average change in body weight over a 24-hour period.

Growing Kids

Growing kids are in positive energy balance and should be gaining between 0 to 0.662 lb/day (0 - 0.300 kg/day).

Breeding Matures

Mature does and bucks in maintenance, pre-breeding and breeding stages should be in zero energy balance and should be not losing or gaining weight.

Pregnant Does

Pregnant does gains weight as the gestation progresses. Most of this gain is due to the fetal growth. Do not include the fetal growth in the Average Daily Gain. The equation for pregnancy requirement for gestation has incorporated the fetal growth as a function of days pregnant, litter size and birth weight of kids. Most of the requirements are for last third portion of gestation.

Fetal growth in early gestation (gestation 105 days) for single kid is about 0.020 - 0.064 lb/day (0.009 - 0.029 kg/day); and for twin kids is about 0.036 - 0.109 lb/day (0.016 - 0.049 kg/day); and for triple or more is about 0.062 - 0.139 lb/day (0.028 - 0.063 kg/day).

Fetal growth in late gestation (gestation 133 days) for single kid is about 0.084 - 0.258 lb/day (0.038 - 0.117 kg/day); for twin kids is about 0.146 - 0.428 lb/day (0.066 - 0.194 kg/day); and for triple or more is about 0.175 - 0.510 lb/day (0.079 - 0.231 kg/day).

Lactating Does

Lactating does in early-lactation usually are in negative energy balance and are losing body weight at a rate of -0.042 to -0.357 lb/day (-0.019 to -0.162 kg/day).

Does in mid-lactation should be in zero energy balance and should be not losing or gaining weight.

Does in late-lactation should be in positive energy balance and should be gaining weight at the rate of 0.287 to 0.304 lb (0.13 to 0.138 kg).

Status

Select a status: [Maintenance] or [Prebreeding or Breeding].

Gender

Select a gender: [Females and Wethers] or [Intact Males].

PREGNANT DOES

For pregnant does, specify the following parameters:

Days Pregnant

Enter the days pregnant. For early gestation enter 105 days and for late gestation enter 133 days. The normal range is from 144 to 155 days.

Birth Weight

Entre birth weight of a single kid or average birth weight of multiple kids. The Normal range is from 1.5 to 11 lb.

Litter Size

Entre litter size. Mature does average 2 kids, but younger does average 1.5 kids.

Lactating Does

For lactating does, specify the following parameters:

DIM

Enter days in milk. Normal range is from 1 to 240 days. The milk yield peaks at day 28 after kidding.

Parlor Milk Yield

Enter the amount of milk yield per goat for which you would like to formulate or evaluate the ration. (Range: 0 to 18 lb/day, or 0 to 8.16 kg/day). Milk production should be entered as the actual amount (lb or kg) per goat per day, not fat-corrected-milk. Do not include the milk suckled by suckling kids.

Percent Fat

Enter the percent fat of milk as a number between 1% and 6%. The standard is 4%.

Suckled Milk

The program estimates the milk suckled by suckling kids using four parameters: (1) Number of suckling kids. (2) Body weight per suckling kid. (3) Average daily gain per suckling kid. (4) Sex ratio of suckling kids. The sex ratio is the ratio of females and wethers to intact males. Enter 1 for litters of all females or wethers. Enter zero for litters of all intact males. The program estimates the amount of suckled milk. If there is no suckling kid, enter zero for the number of suckling kids.

Me Level of Diet

Choose one of the following levels of desired ME concentration of diet. ME stands for Metabolizable Energy:

    0 Let the program decide
    1 Low: 1.91 Mcal/kg (0.87 Mcal/lb)
    2 Mid: 2.39 Mcal/kg (1.08 Mcal/lb)
    3 High: 2.87 Mcal/kg (1.30 Mcal/lb)

During the formulation phase, the program calculates the desired level Of ME, at which, the required feed intake equals the potential feed intake. But you can force a low, mid, or high level of desired ME concentration of diet. In the evaluation phase, the program uses the actual ME concentration of diet.

Acclimatization

The recommended optional adjustment for ME_m for acclimatization is the same as that used in other systems, such as SCA (1990) and NRC (2000), as shown below but fr ME_m with an assumed k_m of 0.70:

$$\text{ME (Mcal/day)} = ((0.00293 * (Tn - Tp)) * 0.322 \text{ MJ/kg BW}^{0.74})/(0.70 * 4.184)$$

Where Tn is the mid-point thermo neutral zone temperature (usually 20 oC) and Tp is the average ambient temperature in the preceding 30 days (oC). Sahlu et al. (2004) suggested that there may be more appropriate mid-point thermo neutral zone temperature for various goats and climatic conditions.

Nutrient Recovery

Sahku et al. (2004) suggested, in accordance with NRC (2000) recommendations for beef cattle, that ME_m be decreased by as much as 20 percent because of low nutritional planes for a period 2 to 3 months in length. In a goat nutrient requirement calculation system complementary to the report of and studies summarized by Sahlu et al. (2004), the change in nutritional plane from a limiting to nonlimiting level and BCS (1 to 5, with 1 being emaciated and 5 quite obese) was used to derive an adjustment factor (AF) to be multiplied by the ME_m based of $BW^{0.75}$.

Activity

Metabolizable energy for maintenance requirements includes activity energy cost of goats in confinement in pens, stalls, or yards. The following equation developed from the method suggested by Sahlu et al. (2004) is proposed to determine and adjustment factor (AF_act) to be multiplied by the ME_m of confined goats to account for activity.

AF_act = (-0.098622685) +
       (-0.002913889)* DIG +
       (0.014209877)* DT +
       (-0.006527778) * TER +
       (0.003465278) * TER * TER +
       (0.054576389) * GWT
Where DIG is digestibility of organic matter and it is calculated from ME concentration of diet:
DIG = 28.12 * ME Mcal/kg

DT is distance traveled (km), and TER is terrain score(1 to 5, with 1 having little or no vertical ascent and little or no movement other than associated with grazing and 5 being very rugged and mountainous), and GWT is grazing and walking time (hours , from 4 to 13 hours)

Nutrient Constraints Screen

The nutrient constraints have been calculated based upon the animal information already entered on the previous page. If you wish to change any of these constraints, you may as follows:

To ADD a constraint: Move your cursor to a blank line and click the [Add] button. A dialog box appears. Enter your new nutrient constraint and then click the [OK] button.

To EDIT a constraint: Move your cursor to the line containing the constraint and click the [Edit] button. A dialog box appears. Modify the existing constraint and then click the [OK] button.

To DELETE a constraint: Move your cursor to the line containing the constraint and click the [Delete] button.

To regenerate default NRC nutrient constraints, click the [ReCalc] button. This will replace all nutrient constraints which you may have changed previously. Alternatively, any change in the Animal Information screen, such as changing the animal weight, will have the same effect as clicking the [ReCalc] button.

Code

This column contains the nutrient codes.

Name

This column contains the nutrient names. The following is a list of nutrients and their abbreviations:

1. DM Dry Matter, %
2. TDN Total Digestible Nut, %
3. DE Digestible Energy, Mcal/lb or Mcal/kg
4. ME Metabolized Energy ,Mcal/lb or Mcal/kg
5. NEM Net Energy for Maint, Mcal/lb or Mcal/kg
6. NEG Net Energy for Gain, Mcal/lb or Mcal/kg
7. NEL Net Energy for Lac,t Mcal/lb or Mcal/kg
8. CP Crude Protein, %
9. MP Metabolizable Protein, %
10. UIP Undegrad Intake Prot, %
11. CF Crude Fiber, %
12. ADF Acid Detergent Fiber, %
13. NDF Neutral Det Fiber, %
14. ENDF Effective NDF, %
15. EE Ether Extract, %
16. ASH Ash, %
17. VITA Vitamin A. RE/lb or RE/kg (RE = 0.3 * IU)
18. VITE Vitamin E ,IU/lb or IU/kg
19. CA Calcium, %
20. P Phosphorus, % K

21. Potassium, %
22. CL Chlorine, %
23. S Sulfur, %
24. MG Magnesium, %
25. NA Sodium, %
26. CO Cobalt, mg/lb or mg/kg (ppm = mg/kg = 2.2046 * mg/lb)
27. CU Copper, mg/lb or mg/kg
28. FE Iron, mg/lb or mg/kg
29. I Iodine, mg/lb or mg/kg
30. MN Manganese, mg/lb or mg/kg
31. SE Selenium, mg/lb or mg/kg
32. ZN Zinc ,mg/lb or mg/kg
33. NUT1 1st User Nut, %
34. NUT2 2nd User Nut, %
35. NUT3 3rd User Nut, %
36. NUT4 4th User Nut, %
37. NUT5 5th User Nut, %

Minimum

This column contains the minimum amount of the selected nutrient that will be included in the ration. It also displays the type of minimum constraint.

Maximum

This column contains the maximum amount of the selected nutrient that will be included in the ration. It also displays the type of maximum constraint.

Calc Feed Intake

The program displays the required and potential feed intake.

Required Dry Matter Intake

The required intake is calculated by dividing required ME (Metabolizable Energy) by the desired or observed concentration of ME in diet:

$$DMI\_req \text{ (kg/day or lb/day)} = ME\_req / ME\_concentration$$

The required ME is the sum of ME for maintenance, gain, pregnancy, and lactation. If the user specifies an arbitrary high production level, then the required intake can be unreasonably high. The required intake is set as the minimum dray matter intake.

Potential Dry Matter Intake

The CAPRICORN program calculates the potential intake to check if the "required intake" is achievable. The potential intake is set as the maximum dry matter intake.

Potential Dry Matter Intake for Kids

The potential intake for kids is calculated using the following equation:

Potential Intake (kg/day or lb/day) = 0.04 * Mature Wt * Z (1.7 -Z)

where Z is the relative size = Body Weight / Mature Weight. This equation gives an intake of about 2.1 to 2.88 percent of Mature Weight, depending on the Relative Size:

Relative Size Intake	% Mature Weight
0.4	2.08 %
0.5	2.40 %
0.6	2.64 %
0.7	2.80 %
0.8	2.88 %
0.9	2.88 %
1.0	2.80 %

Potential Dry Matter Intake for Matures

The potential intake for mature goats is calculated using the following equation:

Potential Intake (kg/day or lb/day) = 0.028 * Body Wt

Feed Intake Adjustments for Required Intake

Dietary ME Adjustment

For growing kids, the required intake must be adjusted for the dietary ME concentration. This adjustment is not applied to mature goats. For a diet with 2.39 Mcal/kg (1.08 Mcal/lb) of ME, no adjustment for dietary ME concentration is necessary. This is because this concentration was the average ME concentration for the database used to derive the requirements.

But with diets having a lower ME concentration, the amount of DM needed to be consumed to meet the maintenance need and to support the particular rate of gain, the amount of dietary DM would need to be adjusted upwards.

A downward adjustment is needed for diets with ME concentrations greater than 2.39 Mcal/kg (1.08 Mcal/lb)

Feed Intake Adjustments for Potential Intake

Quality Constraint

The potential intake equation is for all-grass diet with digestibility of 0.80. As the digestibility of diet decreases, the potential intake will decrease.

Quality Constraint = 1 - 1.7 (0.8 - Dig)

where Dig is digestibility of diet which is determined by the ME concentration of diet.

ME Concentration of Diet   Digestibility
1.91 Mcal/kg or 0.87 Mcal/lb   0.55
2.39 Mcal/kg or 1.08 Mcal/lb   0.67
2.89 Mcal/kg or 1.30 Mcal/lb   0.80

<u>Lactation Adjustment</u>

For lactating does, the potential intake must be adjusted by calculating the intake factor for lactation, a value between 1.0 to 1.884:

Intake Factor for Lactation = 1.0 + 0.025 x 1.3 x $(T \char`\^ 1.4)$ * Exp(-0.05 T)

where T is Day In Milk. The intake factor depends on the Days In Milk. For the first day of lactation, it is about 1. After the first day of lactation, it increases rapidly, until it reaches a peak of 1.884 at 28 days in milk. Then it declines gradually until it reaches again to a value of about 1.0 at 150 days in milk. The potential intake for a lactating doe at the first day of lactation is 2.89 percents of body weight and at 28 days of lactation is 5.274 percent of body weight and at 150 days of lactation is 2.858 percent of body weight.
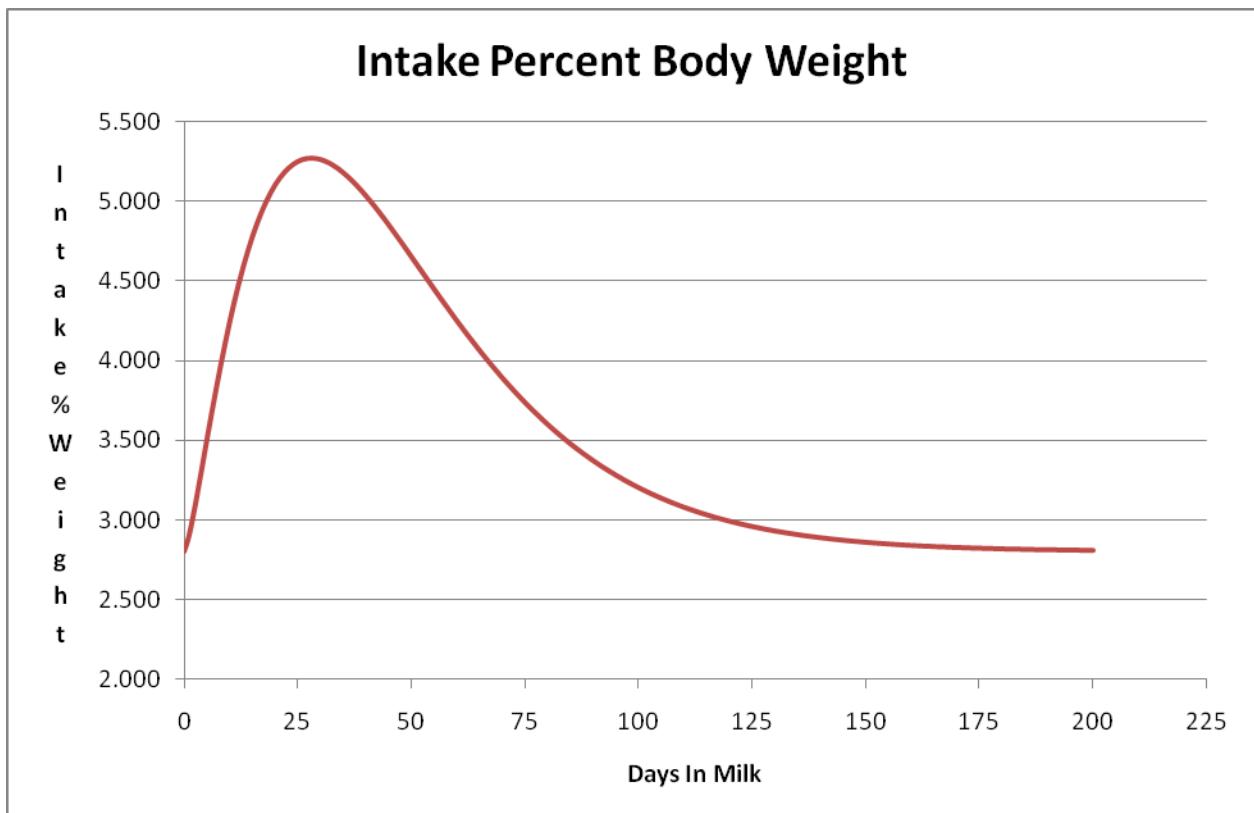
Feed List Screen (Formulation Module)

When you add a feed from the standard or alternate feed libraries to your ration data file, a separate copy of that feed will be added to your ration data file. Change in the feed in your ration data file does not reflect back to the feed in the feed library. Change in the feed in the feed library does not reflect back to the feed in your ration data file. These two feeds remain independent from each other. When you add a new feed, make sure to set its fourth feed group to 13, which specifies the real feeds. This is useful in the output section for viewing only the real feeds and excluding all the infeasible feeds.

Enter the set of feeds that you wish to consider for ration formulation into the table on this page. If you are evaluating an existing ration, enter all of the feeds that are in the ration as well as the amounts as fed per day.

To ADD a feed to the list: use the arrow keys to move to a blank line in the table. Then press the <Add> button.

Feed library codes are as follows:

STD - the information for this feed is stored in the standard library of feeds supplied by the program.

ALT - the feed information is contained in an alternate feed library which has been created or modified by you, the program user.

NEW - the feed information is not contained in any existing feed library. You must enter into the program the entire nutrient analysis for a new feed, since the information is not stored anywhere else.

To DELETE a feed from the list: use the arrow keys to move to the line in the table containing the feed that you wish to delete. Remove the feed by pressing the <Delete> button.

To EDIT a feed: move to the line that you want to edit and then press the <Edit> button.

Feed Number

Each feed in the standard and alternate feed libraries has a unique number assigned to it. If you are entering information for a new feed, you may assign it any number you wish. If you are selecting a feed from one of the existing feed libraries and you do not know its corresponding number, press the arrow in the choice list to get a list of all feed numbers and names in the selected library. You can then use the arrow keys to move to the feed that you want.

Feed Name

Enter a descriptive name for the feed.

Feed Price

Enter the cost of this feed in the units specified: Dollars per ton (English ton = 2000 lb; or dollars per cwt (hundred weight = 100 lb); or dollars per met ton (metric ton = 1000 kg), or dollars per kilogram

If you wish to enter the feed price in a unit different from the one specified, press the <Price Unit> button. After you select the desired price unit, the program will automatically convert any data already entered to the unit selected.

Minimum Amount

You can force a feed to be included in the ration by entering a minimum constraint amount. The program will then include at least this amount and maybe more when formulating the ration. After you enter the desired amount, the program will ask you to identify the type of constraint (i.e. percent, lbs) by displaying a menu of choices. Use the arrow keys to move to the desired constraint type, and then press <Enter>.

To delete an existing minimum constraint, enter 0 for the amount.

Minimum Unit

Identify the type of minimum constraint by using the arrow keys to move to the desired type. Then press the <Enter> key.

Maximum Amount

You can limit the amount of a feed in the ration by entering a maximum constraint on that feed. After you enter the desired amount, the program will ask you to identify the type of constraint (i.e. percent, lbs) by displaying a menu of choices. Use the arrow keys to move to the desired constraint type, and then press <Enter>.

Some of the feeds in the standard feed library have built-in maximum constraints which will automatically be displayed in this column.

To delete an existing maximum constraint, enter 0 for the amount.

Maximum Unit

Identify the type of maximum constraint by using the arrow keys to move to the desired type. Then press the <Enter> key.

Feed Analysis

If you wish to view or edit the nutrient analysis for a particular feed, press the <Feed Analysis> button. The program will then display the entire nutrient analysis for the feed.

If you are entering information for a NEW feed, you must fill in the entire nutrient analysis, since the information for a new feed is not already stored in one of the feed libraries.

All changes are local to this particular ration data file and does not change the nutrient analysis of that particular feed in the standard or alternate feed libraries.

International Feed Number

This field is optional. Common feed stuffs are assigned a 6-digit international feed number (IFN) for identification and computer manipulation. The first digit in the IFN represents the international feed classes:

1. Dry forages and roughages 2. Pasture, range plants, and forage fed fresh 3. Silage 4. Energy feeds 5. Protein supplements 6. Mineral supplements 7. Vitamin supplements 8. Additives

Dry Matter (Percent as Fed)

The dry matter percentage of a feed is 100 minus the moisture percentage of the feed. If a feed is totally dry, it has 100% dry matter. If, for example, the feed has a 20% moisture content, its dry matter percentage would be 80.

Feed Type

Each feed must be classified as either roughage or concentrate. Roughages are feeds containing a high amount of fiber, such as alfalfa hay and corn silage. All other feeds are concentrates.

Mvi Factor

Each roughage feed has a corresponding maximum voluntary intake (MVI) factor (range: 1.0 to 1.4: excellent quality = 1.0, fair quality = 1.4). If an MVI factor for a forage is omitted, the default value = 1.4.

Feed Groups

Each feed may be a member of one or more groups of similar feeds. By placing the feed into a group, you can put constraints on the group of feeds for ration formulation. You can also choose to view the nutrient analysis for a particular feed group in the ration display portion of the program.

All feeds with an identical group number are considered to be members of the same group.

Dry Matter Basis

This field allows you to choose the dry matter basis to use for editing the nutrient analysis of the feed. Most feed nutrient analyses are reported on a 100% dry matter basis. However, if you have nutrient data on other than a 100% dry matter basis, enter the dry matter percentage used for the

analysis and corresponding nutrient data, and the program will convert everything to 100% dry matter internally.

If you wish to enter data on an "as fed" basis, enter 0, and the program will insert the correct basis, as fed.

Feed List Screen (Analysis Modules)

When you add a feed from the standard or alternate feed libraries to your ration data file, a separate copy of that feed will be added to your ration data file. Change in the feed in your ration data file does not reflect back to the feed in the feed library. Change in the feed in the feed library does not reflect back to the feed in your ration data file. These two feeds remain independent from each other. When you add a new feed, make sure to set its fourth feed group to 13, which specifies the real feeds. This is useful in the output section for viewing only the real feeds and excluding all the infeasible feeds.

Enter the set of feeds that you wish to consider for ration formulation into the table on this page. If you are evaluating an existing ration, enter all of the feeds that are in the ration as well as the amounts as fed per day.

To ADD a feed to the list: use the arrow keys to move to a blank line in the table. Then press the <Add> button.

Feed library codes are as follows:

STD - the information for this feed is stored in the standard library of feeds supplied by the program.

ALT - the feed information is contained in an alternate feed library which has been created or modified by you, the program user.

NEW - the feed information is not contained in any existing feed library. You must enter into the program the entire nutrient analysis for a new feed, since the information is not stored anywhere else.

To DELETE a feed from the list: use the arrow keys to move to the line in the table containing the feed that you wish to delete. Remove the feed by pressing the <Delete> button.

To EDIT a feed: move to the line that you want to edit and then press the <Edit> button.

Feed Number

Each feed in the standard and alternate feed libraries has a unique number assigned to it. If you are entering information for a new feed, you may assign it any number you wish. If you are selecting a feed from one of the existing feed libraries and you do not know its corresponding number, press the arrow in the choice list to get a list of all feed numbers and names in the selected library. You can then use the arrow keys to move to the feed that you want.

Feed Name

Enter a descriptive name for the feed.

Feed Price

Enter the cost of this feed in the units specified: Dollars per ton (English ton = 2000 lb; or dollars per cwt (hundred weight = 100 lb); or dollars per met ton (metric ton = 1000 kg), or dollars per kilogram

If you wish to enter the feed price in a unit different from the one specified, press the <Price Unit> button. After you select the desired price unit, the program will automatically convert any data already entered to the unit selected.

Percent in Ration (As Fed Basis)

You can edit the actual percentage of the feed in the ration and thus change the content and nutrient analysis of the ration. This option allows you to view the content of various rations without formulating.

You should enter all feed percentages on an as fed basis. The total parentage of all feeds in ration cannot exceed 100 percent. If you enter a value for a feed that causes to exceed this limit, the program rejects the new value and keeps the old value.

If the total percentage of all feeds in ration is less than 100 percent, the program proceeds to evaluation section and adjusts the amount of feeds in ration accordingly.

Feed Analysis

If you wish to view or edit the nutrient analysis for a particular feed, press the <Feed Analysis> button. The program will then display the entire nutrient analysis for the feed.

If you are entering information for a NEW feed, you must fill in the entire nutrient analysis, since the information for a new feed is not already stored in one of the feed libraries.

All changes are local to this particular ration data file and does not change the nutrient analysis of that particular feed in the standard or alternate feed libraries.

International Feed Number

This field is optional. Common feed stuffs are assigned a 6-digit international feed number (IFN) for identification and computer manipulation. The first digit in the IFN represents the international feed classes:

1. Dry forages and roughages 2. Pasture, range plants, and forage fed fresh 3. Silage 4. Energy feeds 5. Protein supplements 6. Mineral supplements 7. Vitamin supplements 8. Additives

Dry Matter (Percent as Fed)

The dry matter percentage of a feed is 100 minus the moisture percentage of the feed. If a feed is totally dry, it has 100% dry matter. If, for example, the feed has a 20% moisture content, its dry matter percentage would be 80.

Feed Type

Each feed must be classified as either roughage or concentrate. Roughages are feeds containing a high amount of fiber, such as alfalfa hay and corn silage. All other feeds are concentrates.

Mvi Factor

Each roughage feed has a corresponding maximum voluntary intake (MVI) factor (range: 1.0 to 1.4: excellent quality = 1.0, fair quality = 1.4). If an MVI factor for a forage is omitted, the default value = 1.4.

Feed Groups

Each feed may be a member of one or more groups of similar feeds. By placing the feed into a group, you can put constraints on the group of feeds for ration formulation. You can also choose to view the nutrient analysis for a particular feed group in the ration display portion of the program.

All feeds with an identical group number are considered to be members of the same group.

Dry Matter Basis

This field allows you to choose the dry matter basis to use for editing the nutrient analysis of the feed. Most feed nutrient analyses are reported on a 100% dry matter basis. However, if you have nutrient data on other than a 100% dry matter basis, enter the dry matter percentage used for the analysis and corresponding nutrient data, and the program will convert everything to 100% dry matter internally.

If you wish to enter data on an "as fed" basis, enter 0, and the program will insert the correct basis, as fed.

Feed Group Constraints Screen

This table lists all of the feed groups that have been specified in the feed list.

To ADD a group to the list: You cannot add a feed group directly. The program adds groups automatically when a feed which belongs to that group is added in the previous screen.

To DELETE a group from the list: You cannot delete a feed group directly. The programs deletes groups automatically when all feeds which belongs to that group are deleted in the previous screen.

Two exceptions are the pre-defined Roughage and Concentrate groups, which are built in to the program and can never be deleted.

Group Name

Enter a descriptive name for the feed group.

Minimum Amount

You can force a feed group to be included in the ration by entering a minimum constraint amount. The program will then include at least this amount and maybe more when formulating the ration. After you enter the desired amount, the program will ask you to identify the type of constraint (i.e. percent, lbs) by displaying a menu of choices. Use the arrow keys to move to the desired constraint type, and then press <Enter>.

To delete an existing minimum constraint, enter 0 for the amount.

Minimum Unit

Identify the type of minimum constraint by using the arrow keys to move to the desired type. Then press the <Enter> key.

Maximum Amount

You can limit the amount of a feed group in the ration by entering a maximum constraint on that group. After you enter the desired amount, the program will ask you to identify the type of constraint (i.e. lbs, percent) by displaying a menu of choices. Use the arrow keys to move to the desired constraint type, and then press <Enter>.

Many of the feed groups in the standard library have built-in maximum constraints which will automatically be displayed in this column.

To delete an existing maximum constraint, enter 0 for the amount. MAXIMUM UNIT

Identify the type of maximum constraint by using the arrow keys to move to the desired type. Then press the <Enter> key.

Ratio Constraints Screen

In this table you can define ratio constraints to be used for ration formulation, or you can simply specify a set of ratios to automatically be calculated by the program when displaying the contents of the ration.

To ADD a ratio to the list: use the arrow keys to move to a blank line in the table and click the <Add> button.

Ratio types are as follows: Nut - nutrient ratios; Fd - feed ratios; Grp - feed group ratios

To DELETE a ratio from the list: use the arrow keys to move to the line in the table containing the ratio that you wish to delete. Then click the <Delete> button.

To EDIT a ratio: move to the line that you want to edit and then click the <Edit> button.
NUMERATOR CODE

Each ratio has two parts: a numerator and a denominator. If, for example, you are defining calcium to phosphorus ratio, the numerator is calcium and the denominator is phosphorus.

Enter the code for the numerator in this column. DENOMINATOR CODE

Each ratio has two parts: a numerator and a denominator. If, for example, you are defining calcium to phosphorus ratio, the numerator is calcium and the denominator is phosphorus.

Constraint Amount

You should enter a ratio constraint amount as x.xx to 1, where the x's represent the ratio of the numerator to the denominator. For example, if you want to have twice as much calcium as phosphorus in the ration, you would define calcium to phosphorus ratio of 2 to 1, where 2 is the number that you would specify for the constraint amount.

If you do not want to enter a constraint for formulation but you do want to have the actual ratio calculated by the program when displaying the contents of the ration, enter 0 for the constraint amount.

Constraint Unit

Identify the type of ratio constraint by using the arrow keys to move to the desired type. Then press the <Enter> key.

Output (Ration)

Ration (or Feed Group) Composition

This section displays the amounts of all feeds used in the ration, or the amounts for a feed group selected by using the Feed Group button. The following information is included for each feed used in the ration (or group):

1. The amount of the feed in the ration, lb/day or kg/day, as fed basis.
2. The percentage of the feed in the ration (or group), as fed basis.
3. The amount of the feed in the ration, lb/day or kg/day, on a 100% dry matter basis.
4. The percentage of the feed in the ration (or group), on a 100% dry matter basis.
5. Feed and feed group ratios.

If you previously defined any feed or group ratios on the Ratios List, the program will calculate the ratio amounts in the ration (or feed group) and display them in this section. Feed ratios will be displayed only if both feeds are used in the ration (or group). Group ratios are displayed only when viewing the composition of ALL FEEDS in the ration.

Prices and Feeds Not Used

This section displays the following information for feeds used in the ration:

1. The amount of each feed in the ration, lb/day or kg/day on an as fed basis.
2. The current price of the feed on an as fed basis.
3. The lower range of the feed price. This is the lowest price that the feed can have without affecting its amount used in the ration. If you change the price of a feed below the lower range and then reformulate the ration, the ration composition will change to include more of that feed. Other feeds previously used in the ration may no longer be used. If the lower range is negative, it is not practical to use more of the feed in the ration. A lower range of 999999.99 means minus infinity and the feed amount in the ration cannot be increased due to a maximum constraint on that feed.
4. The upper range of the feed price. This is the highest price that the feed can have without affecting its amount used in the ration. If you change the price of a feed above the upper range and then reformulate the ration, the ration composition will change to include less of that feed, or the feed may be eliminated from the ration. An upper range of 999999.99 means infinity and the feed amount in the ration cannot be decreased due to a minimum constraint on that feed.

For feeds NOT USED in the ration, this section displays the following:

1. The current price of the feed on an as fed basis.
2. The opportunity price of the feed. This is the highest price that the feed can have if it is to be included in the ration without increasing the cost of the ration, or decreasing the income over feed cost.

Nutrient Analysis of Ration (or Feed Group)

This section displays the estimated nutrient content of the total ration, or for a feed group selected by using the Feed Group button. The following information is included:

1. Amount and type. Two lines are displayed for each nutrient: line 1 is the CONCENTRATION (percent, ppm, Mcal/lb, etc.) of the nutrient. Line 2 is the AMOUNT (lb, kg, Mcal, etc.) of the nutrient contained in the ration or in a selected feed group.

2. NRC recommendation. This is the nutrient amount recommended by NRC Nutrient Requirements of Goats (2007).These amounts are calculated internally by the program, based upon the data that you supplied on the Animal Information page. By comparing the NRC recommendation with the actual amount of the nutrient in the ration, you can determine if the ration is deficient in that particular nutrient.

3. Nutrient ratios. If you previously defined any nutrient ratios on the Ratios List, the program will calculate the ratio amounts in the ration (or feed group) and display them in this section.

If you have just formulated a ration, you will also see the following:

4. Minimum and maximum constraints. These are the nutrient constraints that were used by the program for the ration formulation.

By pressing the <DM Basis> button, you can change the dry matter basis for calculation of the nutrient analysis. The dry matter basis affects the concentration of the nutrients, but not the actual amounts or ratios of nutrients in the ration. The nutrient constraints and the NRC minimum requirements also are affected by the dry matter basis if they represent nutrient concentrations and not actual amounts or ratios.

Nutrient Analysis of Feeds in Ration Data File

This section displays the nutrient content of all feeds that you have selected for this ration formulation or analysis. Analyses are expressed on a 100% dry matter basis unless changed by the user.

By pressing the <DM Basis> button, you can change the dry matter basis for expressing the nutrient analysis. Enter 0 to express the analysis for all feeds on an as fed basis.

If an asterisk (*) appears in any column, the nutrient amount for the feed in question is too large to be printed inside that column. You can view the actual amount by looking at the nutrient analysis within the feed list page in the input section of this program.

Combine Feeds into a Mix: Feed Number

The Combine feeds option allows you to combine some, or all, of the feeds used in this ration into a single feed mix. You must specify a feed number and a name for the new feed mix, along with the amount of each feed to be included in the new feed mix.

The program will calculate the price and nutrient content of the new feed mix and add it to the feed list of the current ration file.

Allowable numbers for the new mix feed range from 1 to 999.

Feed Name

Enter a descriptive name for the new feed mix.

Amount In Mix

Enter the amount of this feed to be included in the new feed mix. You should enter all feed amounts on an as fed basis.

Feed Library

There are three feed libraries: 1. Standard feed library with a capacity of 999 feeds. 2. Alternate feed library with a capacity of 999 feeds. 3. Infeasible feed library with a capacity of 999 feeds.

All three feed libraries have the following fields:

Feed Number

Each feed in the feed libraries has a unique number assigned to it. If you are entering information for a new feed, you may assign it any number you wish.

International Feed Number

Each feed is assigned a 6-digit international feed number (IFN) for identification and computer manipulation. The first digit in IFN represents the international feed classes: 1. Dry forages and roughages 2. Pasture, range plants, and forage fed fresh 3. Silage 4. Energy feeds 5. Protein supplements 6. Mineral supplements 7. Vitamin supplements 8. Additives

Name

Enter a descriptive name.

Feed Price

Enter the cost of this feed in dollars per English ton, or dollars per hundred lbs, or dollars per metric ton, or dollars per kg.

Feed Price Unit

Valid units are: TON English ton (= 2000 lb) CWT hundredweight (= 100 lb) MET TON metric ton (= 1000 kg) KG kilogram (= 2.205 lb)

Feed: Minimum Amount

You can force a feed to be included in the ration by entering a minimum constraint amount. The program will then include at least this amount and maybe more when formulating the ration. After you enter the desired amount, the program will ask you to identify the type of constraint (i.e. percent, lbs) by displaying a menu of choices. To delete an existing minimum constraint, enter 0 for the amount.

Feed: Minimum Unit

Identify the type of minimum constraint.

Feed: Maximum Amount

You can limit the amount of a feed in the ration by entering a maximum constraint on that feed. After you enter the desired amount, the program will ask you to identify the type of constraint (i.e. percent, lbs) by displaying a menu of choices.

Many of the feeds in the standard feed library have built-in maximum constraints which will automatically be displayed in this column.

To delete an existing maximum constraint, enter 0 for the amount.

Feed: Maximum Unit

Identify the type of maximum constraint.

Dry Matter (Percent As Fed)

The dry matter percentage of a feed is 100 minus the moisture percentage of the feed. If a feed is totally dry, it has 100% dry matter. If, for example, the feed has a 20% moisture content, its dry matter percentage would be 80.

Feed Type

Each feed must be classified as either a roughage or a concentrate. Roughages are feeds containing a high amount of fiber, such as alfalfa hay and corn silage. All other feeds are concentrates. R for Roughage C for Concentrates

MVI Factor

Each roughage feed has a corresponding maximum voluntary intake (MVI) factor (range: 1.0 to 1.4: excellent quality = 1. fair quality = 1.4). If an MVI factor for a forage is omitted, the default value = 1.4.

Feed Groups

Each feed may be a member of one or more groups of similar feeds. By placing the feed into a group, you can put constraints on the group of feeds for ration formulation. You can also choose to view the nutrient analysis for a particular feed group in the ration display portion of the program.

All feeds with an identical group number are considered to be members of the same group.

Dry Matter Basis

This line allows you to choose the dry matter basis to use for editing the nutrient analysis of the feed. Most feed nutrient analyses are reported on a 100% dry matter basis. However, if you have nutrient data on other than a 100% dry matter basis, enter the dry matter percentage used for the

analysis and corresponding nutrient data, and the program will convert everything to 100% dry matter internally.

If you wish to enter data on an 'as fed' basis, enter and the program will insert the correct basis, as fed.

Feed Library: Feed Group Library

There is one feed group library with a capacity of 99 groups.

Group Number

Each feed group should have a unique number between 1-99.

Group Name

Enter a descriptive name for the feed group.

Minimum Amount

You can force a feed group to be included in the ration by entering a minimum constraint amount. The program will then include at least this amount and maybe more when formulating the ration. After you enter the desired amount, the program will ask you to identify the type of constraint (i.e. percent, lbs) by displaying a menu of choices. Use the arrow keys to move to the desired constraint type, and then press the <Enter> key.

To delete an existing minimum constraint, enter 0 for the amount.

Minimum Unit

Identify the type of minimum constraint by using the arrow keys to move to the desired type. Then press the <Enter> key.

Maximum Amount

You can limit the amount of a feed group in the ration by entering a maximum constraint on that group. After you enter the desired amount, the program will ask you to identify the type of constraint (i.e. lbs, percent) by displaying a menu of choices. Use the arrow keys to move to the desired constraint type, and then press the <Enter> key.

Many of the feed groups in the standard library have built-in maximum constraints which will automatically be displayed in this column.

To delete an existing maximum constraint, enter 0 for the amount.

Maximum Unit

Identify the type of maximum constraint by using the arrow keys to move to the desired type. Then press the <Enter> key.

Delivery Module: General Information

Title

Enter a name and/or address or other identification for your ration on these two lines. The title will be displayed at the top of all printed output for this ration.

Wt Unit

You may choose to enter data using either the English or the metric system.

Enter lb to display all input and output in English units. Enter kg to display all input and output in metric units.

The program will automatically convert any data already entered to the unit selected.

Loading Schedule Type

You may choose to calculate the loading schedules based upon the total number of animals to be fed OR the total amount of feed (lb or kg per feeding per day) to be added to the mix. Total feed amounts do NOT include feeds in the ration that are fed separately from the mix.

If all feeds in the ration are to be fed separately (there is no mix to be created), the total amount (lb or kg) that you enter on this line will correspond to the total amount of feeds fed separately (lb or kg per feeding per day).

Feed Loading Minimum Amount

Feed loading schedules are calculated for a range of the total number of animals to be fed. Enter the minimum number of animals to be fed on this line (range: 0 to 45000 animals).

If you have specified lb or kg instead of animals as the schedule type, enter the minimum amount of mix to be created (lb or kg per feeding per day; range: 0 to 45000 lb, or 0 to 20400 kg).

Feed Loading Maximum Amount

Feed loading schedules are calculated for a range of the total number of animals to be fed. Enter the maximum number of animals to be fed on this line (range: 0 to 45000 animals).

If you have specified lb or kg instead of animals as the schedule type, enter the maximum amount of mix to be created (lb or kg per feeding per day; range: 0 to 45000 lb, or 0 to 20400 kg).

Feed Loading Increment

Feed loading schedules are calculated for a range of the total number of animals to be fed. Enter the number of animals that you want to use as an increment for calculating each of the schedules (range: 0 to 45000 animals).

If you have specified lb or kg instead of animals as the schedule type, enter the increment for the total amount of mix to be created (lb or kg per feeding per day; range: 0 to 45000 lb, or 0 to 20400 kg).

The program will calculate a maximum of twelve schedules.

Unloading Schedule Type

You may choose to calculate the unloading schedules based upon the total number of animals to be fed OR the total amount (lb or kg per feeding per day) to be unloaded from the mix. Total amounts do NOT include feeds in the ration that are fed separately from the mix.

If all feeds in the ration are to be fed separately (there is no mix feed), the total amount (lb or kg) that you enter on this line will correspond to the total amount of feeds fed separately (lb or kg per feeding per day).

Feed Unloading Minimum Amount

Feed unloading schedules are calculated for a range of the total number of animals to be fed. Enter the minimum number of animals to be fed on this line (range: 0 to 45000 animals).

If you have specified lb or kg instead of animals as the schedule type, enter the minimum amount of mix to be unloaded (lb or kg per feeding per day; range: 0 to 45000 lb, or 0 to 20400 kg).

Feed Unloading Maximum Amount

Feed unloading schedules are calculated for a range of the total number of animals to be fed. Enter the maximum number of animals to be fed on this line (range: 0 to 45000 animals).

If you have specified lb or kg instead of animals as the schedule type, enter the maximum amount of mix to be unloaded (lb or kg per feeding per day; range: 0 to 45000 lb, or 0 to 20400 kg).

Feed Unloading Increment

Feed unloading schedules are calculated for a range of the total number of animals to be fed. Enter the number of animals that you want to use as an increment for calculating each of the schedules (range: 0 to 45000 animals).

If you have specified lb or kg instead of animals as the schedule type, enter the increment for the total amount of mix to be unloaded (lb or kg per feeding per day; range: 0 to 45000 lb, or 0 to 20400 kg).

The program will calculate a maximum of twelve schedules.

Mix Feeds: Number of Feedings Per Day

Enter the number of times per day that the animals are to be given ration feeds included in a mix (range: 1 to 9 feedings per day).

Rounding Factor for Scale Weights

Enter the rounding factor used to display the scale weights in the loading and unloading schedules. You have the following choices for rounding factors:

1 nearest one lb (kg) (158.347 displays as 158) 10 nearest ten lb (kg) (158.347 displays as 160) 0.1 nearest tenth lb (kg) (158.347 displays as 158.3) 0.01 nearest hundredth lb (kg) (158.347 displays as 158.35)

DELIVERY MODULE: SEPARATE FEED LIST

Library Code

Feed library codes are as follows: STD - the information for this feed is stored in the standard library of feeds supplied by the program. ALT - the feed information is contained in an alternate feed library which has been created or modified by you, the program user. NEW - the feed information is not contained in any existing feed library. You must enter into the program the entire nutrient analysis for a new feed, since the information is not stored anywhere else.

Feed Number

Each feed in the standard and alternate feed libraries has a unique number assigned to it.

Feed Name

Each feed has a descriptive name.

Amount In Ration

This field shows the actual amount of the feed in the ration.

Amount Fed Separately

Enter the amount of this feed that is to be fed separately from the mix.

You should enter all feed amounts on an as fed basis, lbs or kgs per day.

Delivery Module: Mix Feed List

Library Code

Feed library codes are as follows: STD - the information for this feed is stored in the standard library of feeds supplied by the program. ALT - the feed information is contained in an alternate feed library which has been created or modified by you, the program user. NEW - the feed information is not contained in any existing feed library. You must enter into the program the entire nutrient analysis for a new feed, since the information is not stored anywhere else.

Feed Number

Each feed in the standard and alternate feed libraries has a unique number assigned to it.

Feed Name

Each feed has a descriptive name.

Amount In Ration

This field shows the actual amount of the feed in the ration.

Amount In Mix

Enter the amount of this feed that is to be included in the mix.

You should enter all feed amounts on an as fed basis, lbs or kgs per day.

Order in Mix

The order in mix specifies the order that this feed is to be loaded onto the mixer.

Press the <Up> button to move up the feed in the list. Press the <Dn> button to move down the feed in the list.

Delivery Module: Output

Loading Schedule

This section displays the loading schedules for all feeds used in the ration, or for a feed group selected by using the <Feed Group> button.

Loading schedules are displayed for both mix feeds and feeds fed separately from the mix. A maximum of twelve schedules will be printed.

For each feed fed separately, the schedule shows the amount to be fed at each feeding.

For each feed in the mix, the schedule shows the actual amount of the feed to be added to the mixer, along with the mixer scale reading that will be obtained after the feed has been added. Mix feeds are added in the order that you previously specified on the Mix Feed List form.

Unloading Schedule

This section displays the unloading schedules for all feeds used in the ration, or for a feed group selected by using the <Feed Group> button.

Unloading schedules are displayed for the mix feed, along with all feeds fed separately from the mix. A maximum of twelve schedules will be printed.

For each feed fed separately and for the mix, the schedule shows the amount to be unloaded for each feeding.

The number of feedings per day is displayed in parentheses after the amount to be unloaded.

Feedtag

Description of fields in this screen:

Feed Name: Assign a name for feed.
                                    Example, ALFALFA

Feed Group: Select a group for feed.
                                     Example, B. Dry forage and roughage :Legumes(1)

Dry Matter of Feed: Enter a value between 0 to 100%.
                                    Example: 20.00%

Crude Protein (CP):   Enter a value between 0 to 100%.
                                    Example: 90.00%

NPN Protein Equivalent: Enter a value between 0 to 100%.
                                    Example: 0.00%

Fat or Oil (EE):   Enter a value between 0 to 100%.
                                    Example: 2.70%

Ash: Enter a value between 0 to 100%.
                                    Example: 9.80%

Crude Fiber (CF):   Enter a value between 0 to 100%.
                                    Example: 23.00%

After entering input values, click the Calculate button, the program calculates energy values, using the following algorithm:

Step 1. Converts all values to 100% DM basis.

Step 2. Calculates Digestible Energy, Mcal/kg, for different groups:

  Grp A: DE= 3.916828-0.00812 *CP+0.04554 *EE-0.0176 *ash-0.0422 *CF
  Grp B: DE= 2.811904+0.0209413*CP+0.006492 *EE+0.01302*ash-0.0274 *CF
  Grp C: DE= 3.264743+0.06363 *CP-0.0761 *EE-0.0508 *ash-0.0283 *CF
  Grp D: DE= 3.723255+0.002459 *CP+0.0815818*EE-0.0211 *ash-0.036135*CF
  Grp E: DE= 3.681242-0.0130 *CP+0.04553 *EE-0.0328 *ash-0.0284 *CF
  Grp F: DE= 3.729697+0.008047 *CP+0.04582 *EE-0.0393 *ash-0.0392 *CF
  Grp G: DE= 4.706482-0.0158 *CP+0.034633 *EE-0.0241 *ash-0.0598 *CF

Step 3. Corrects for Non Protein Nitrogen Protein Equivalent:
        DE = DE * (1-(CP * NPN/28200))

Step 4. All other energy values are calculated by using DE.

Metabolizable Energy, Mcal/kg:
ME = 0.82 * DE

Net Energy for Maintenance, Mcal/kg:
NEM = 1.37 * ME - 0.138 * ME * ME + 0.0105 * ME * ME * ME - 1.12

Net Energy for Gain, Mcal/kg:
NEG = 1.42 * ME - 0.147 * ME * ME + 0.0122 * ME * ME * ME - 1.65

Total Digestible Nutrients, %:
TDN = 100 * (DE/4.4)

Net Energy for Lactation, Mcal/kg:
NEL = 0.0245 * TDN - 0.12

Step 5. Converts to English system, if necessary.

FEED NO	FEED NAME	FEED GROUP	DM %	TDN %	ME Mcal/kg	CP %	MP %	CF %	VITA ER/kg	VITE IU/kg	CA %	P %
1	Alfalfa cubes	5	91	57.000	2.060	18.000	12.600	29.000	0	0.00	1.30	0.23
2	Alfalfa Dehyd 17% CP	5	92	61.000	2.200	19.000	13.300	26.000	26200	121.00	1.42	0.25
3	Alfalfa fresh	1	24	61.000	2.200	19.000	13.300	27.000	37000	0.00	1.35	0.27
4	Alfalfa Hay Erly Blm	1	90	59.000	2.130	19.000	13.300	28.000	28000	26.00	1.41	0.26
5	Alfalfa Hay Fll Blm	1	88	54.000	1.950	16.000	11.200	34.000	13000	0.00	1.20	0.23
6	Alfalfa Hay Mature	1	88	50.000	1.800	13.000	9.100	38.000	2400	0.00	1.18	0.19
7	Alfalfa Hay Md Blm	1	89	58.000	2.090	17.000	11.900	30.000	0	0.00	1.40	0.24
8	Alfalfa Leaf Meal	5	89	69.000	2.490	28.000	19.600	15.000	17600	0.00	2.88	0.34
9	Alfalfa Seed Scrnngs	5	91	84.000	3.030	34.000	23.800	13.000	0	0.00	0.30	0.67
10	Alfalfa Silage	1	30	55.000	1.980	18.000	12.600	28.000	19800	0.00	1.40	0.29
11	Alfalfa Silage Wltd	1	39	58.000	2.090	18.000	12.600	28.000	12000	0.00	1.40	0.29
12	Alfalfa Stems	5	89	47.000	1.700	11.000	7.700	44.000	0	0.00	0.90	0.18
13	Almond Hulls	5	89	59.000	2.130	5.000	3.500	16.000	0	0.00	0.25	0.10
14	Ammonium Chloride	7	99	0.000	0.000	163.000	114.100	0.000	0	0.00	0.00	0.00
15	Ammonium Sulfate	7	99	0.000	0.000	132.000	92.400	0.000		0.00	0.00	0.00
16	Apple Pomace Dried	5	89	65.000	2.350	5.000	3.500	19.000	0	0.00	0.13	0.12
17	Apple Pomace Wet	5	20	68.000	2.450	6.000	4.200	17.000	0	0.00	0.14	0.14
18	Artichoke Tops Jrslm	5	27	61.000	2.200	6.000	4.200	18.000	0	0.00	1.62	0.11
19	Avacado Seedmeal	5	91	52.000	1.880	20.000	14.000	19.000	0	0.00	0.00	0.00
20	Bahiagrass Hay	1	90	51.000	1.840	8.000	5.600	32.000	36600	0.00	0.48	0.20
21	Bakery Product Dried	5	90	90.000	3.250	12.000	8.400	4.000	3100	45.00	0.18	0.28
22	Barley Grain	2	89	84.000	3.030	12.000	8.400	5.000	263	25.00	0.06	0.38
23	Barley Grain StmFlkd	2	85	90.000	3.250	12.000	8.400	5.000	0	0.00	0.06	0.35
24	Barley Grain StmRlld	2	86	84.000	3.030	12.000	8.400	5.000	0	0.00	0.06	0.41
25	Barley Hay	1	90	57.000	2.060	9.000	6.300	28.000	10600	0.00	0.30	0.28
26	Barley Silage	1	35	59.000	2.130	12.000	8.400	34.000	0	0.00	0.46	0.30
27	Barley Silage Mature	1	35	58.000	2.090	12.000	8.400	30.000	0	0.00	0.30	0.20
28	Barley Straw	1	90	43.000	1.550	4.000	2.800	42.000	400	0.00	0.33	0.08
29	Beans Navy Cull	2	90	84.000	3.030	24.000	16.800	5.000	0	0.00	0.15	0.59
30	Beet Pulp Dried	5	91	75.000	2.710	11.000	7.700	21.000	0	0.00	0.65	0.08
31	Beet Pulp Wet	5	17	76.000	2.740	11.000	7.700	20.000	0	0.00	0.68	0.08
32	Beet Tops (Silage)	1	25	52.000	1.880	12.000	8.400	12.000	0	0.00	1.38	0.22
33	Beet Tops (Sugar)	1	20	58.000	2.090	14.000	9.800	10.000	0	0.00	1.20	0.23
34	Bermudagrss Cstl Dhy	1	90	62.000	2.240	16.000	11.200	26.000	0	0.00	0.40	0.25
35	Bermudagrss Cstl Hay	1	89	56.000	2.020	10.000	7.000	30.000	21000	0.00	0.47	0.21
36	Bermudagrass Hay	1	89	53.000	1.910	10.000	7.000	30.000	11600	0.00	0.46	0.20
37	Bermudagrass Silage	1	26	50.000	1.800	10.000	7.000	30.000	0	0.00	0.46	0.20
38	Birdsfoot Trfl Fresh	1	22	66.000	2.380	21.000	14.700	21.000	0	0.00	1.78	0.25
39	Birdsfoot Trfl Hay	1	89	57.000	2.060	16.000	11.200	0.000	0	0.00	1.73	0.24
40	Blood Meal Swn Pltry	4	91	66.000	2.380	92.000	64.400	0.000	0	0.00	0.32	0.28
41	Bluegrass KY FrshEly	1	36	69.000	2.490	15.000	10.500	27.000	43800	0.00	0.37	0.30
42	Bluegrass Straw	1	93	45.000	1.620	6.000	4.200	40.000	0	0.00	0.20	0.10
43	Bread Byproduct	5	68	91.000	3.280	14.000	9.800	1.000	0	0.00	0.09	0.18
44	Brewers Grains Dried	5	92	84.000	3.030	25.000	17.500	14.000	0	29.00	0.29	0.60
45	Brewers Grains Wet	5	23	85.000	3.070	27.000	18.900	13.000	0	0.00	0.29	0.61
46	Brewers Yeast Dried	5	94	79.000	2.850	48.000	33.600	0.000	0	0.00	0.10	1.56
47	Bromegrass Frsh Imm	1	30	64.000	2.310	15.000	10.500	28.000	38400	0.00	0.45	0.34
48	Bromegrass Grain	2	88	77.000	2.780	12.000	8.400	12.000	0	0.00	0.11	0.36
49	Bromegrass Hay	1	89	55.000	1.980	10.000	7.000	35.000	6800	0.00	0.40	0.23
50	Bromegrass Haylage	1	35	57.000	2.060	11.000	7.700	36.000	0	0.00	0.38	0.30
51	Cabbage Fresh	1	9	84.000	3.030	16.100	11.300	6.700	0	0.00	0.64	0.35
52	Cactus	1	26	63.000	2.270	5.000	3.500	18.000	0	0.00	3.50	0.10
53	Calcium Carbonate	7	99	0.000	0.000	0.000	0.000	0.000	0	0.00	38.50	0.04

FEED NO	FEED NAME	FEED GROUP	DM %	TDN %	ME Mcal/kg	CP %	MP %	CF %	VITA ER/kg	VITE IU/kg	CA %	P %
54	Canarygrass Hay	1	91	53.000	1.910	9.000	6.300	32.000	5200	0.00	0.38	0.25
55	Canberry Pulp Meal	5	88	49.000	1.770	7.000	4.900	26.000	0	0.00	0.00	0.00
56	Canola Meal Solvent	4	90	71.000	2.560	40.000	28.000	12.000	0	0.00	0.75	1.16
57	Carrot Pulp	5	14	62.000	2.240	6.000	4.200	19.000	0	0.00	0.00	0.00
58	Carrot Tops	1	16	73.000	2.630	13.000	9.100	18.000	0	0.00	1.94	0.19
59	Carrot Tuber Fresh	5	12	83.000	2.990	10.000	7.000	9.000	135600	60.00	0.60	0.30
60	Cassava Tubers Fresh	5	37	80.000	2.890	0.500	0.400	1.700	0	0.00	0.00	0.00
61	Citrus Pulp Dehy	5	90	79.000	2.850	7.000	4.900	13.000	0	0.00	1.81	0.12
62	Clover Ladino Fresh	1	19	69.000	2.490	25.000	17.500	14.000	70600	0.00	1.27	0.38
63	Clover Ladino Hay	1	90	61.000	2.200	21.000	14.700	22.000	16600	0.00	1.35	0.32
64	Clover Red Fresh	1	24	64.000	2.310	18.000	12.600	24.000	40400	0.00	1.70	0.30
65	Clover Red Hay	1	88	55.000	1.980	15.000	10.500	30.000	4000	0.00	1.50	0.25
66	Clover Sweet Hay	1	91	53.000	1.910	16.000	11.200	30.000	19800	0.00	1.27	0.25
67	Coconut Meal	5	92	71.000	2.560	21.000	14.700	12.000	0	0.00	0.63	0.21
68	Coffee Grounds	5	88	20.000	0.720	13.000	9.100	41.000	0	0.00	0.10	0.08
69	Corn and Cob Meal	5	87	82.000	2.960	9.000	6.300	9.000	526	20.00	0.06	0.28
70	Corn Bran	5	91	76.000	2.740	11.000	7.700	10.000	0	0.00	0.04	0.15
71	Corn Cannery Waste	5	29	68.000	2.450	8.000	5.600	28.000	0	0.00	0.10	0.29
72	Corn Cobs	5	90	48.000	1.730	3.000	2.100	36.000	132	0.00	0.12	0.04
73	Corn Gluten Feed	5	90	80.000	2.890	22.000	15.400	9.000	921	14.00	0.12	0.85
74	Corn Gluten Meal HCP	2	91	89.000	3.210	67.000	46.900	4.000	4474	26.00	0.06	0.54
75	Corn Gluten Meal LCP	2	91	85.000	3.070	46.000	32.200	5.000	2369	34.00	0.13	0.55
76	Corn Grain High Mstr	2	74	93.000	3.360	10.000	7.000	2.000	0	0.00	0.02	0.30
77	Corn Grain Rolled	2	88	88.000	3.180	9.000	6.300	2.000	0	0.00	0.02	0.30
78	Corn Grain Steam Fkd	2	85	93.000	3.360	9.000	6.300	2.000	0	0.00	0.02	0.27
79	Corn Grain Whole	2	88	88.000	3.180	9.000	6.300	2.000	395	25.00	0.02	0.30
80	Corn Screenings	5	86	91.000	3.280	10.000	7.000	3.000	0	0.00	0.04	0.27
81	Corn Silage Mtr Eard	1	34	72.000	2.600	8.000	5.600	21.000	5922	0.00	0.28	0.23
82	Corn Silage Milk Stg	1	26	65.000	2.350	8.000	5.600	26.000	0	0.00	0.40	0.27
83	Corn Silage Swt Corn	1	24	65.000	2.350	11.000	7.700	20.000	1711	0.00	0.24	0.26
84	Corn Stover Mtr Stlk	1	80	59.000	2.130	5.000	3.500	35.000	0	0.00	0.35	0.19
85	Corn Whole Plnt Pell	1	91	63.000	2.270	9.000	6.300	21.000	0	0.00	0.50	0.24
86	Cotton Gin Trash	5	91	42.000	1.520	10.000	7.000	34.000	0	0.00	1.70	0.25
87	Cottonseed Hulls	5	90	45.000	1.620	5.000	3.500	48.000	0	0.00	0.15	0.08
88	Cottonseed Meal Mch	4	92	80.000	2.890	46.000	32.200	13.000	0	0.00	0.21	1.19
89	Cottonseed Meal Slvn	4	90	77.000	2.780	48.000	33.600	13.000	0	0.00	0.22	1.25
90	Cottonseed Whole	3	91	95.000	3.430	23.000	16.100	29.000	0	0.00	0.14	0.64
91	Cottonseed Whl Dlntd	3	90	95.000	3.430	24.000	16.800	20.000	0	0.00	0.13	0.55
92	Cottonseed Whl Extrd	3	92	87.000	3.140	26.000	18.200	32.000	0	0.00	0.17	0.68
93	Crab Meal Waste	5	91	29.000	1.050	32.000	22.400	0.000	0	0.00	15.00	1.88
94	Crambe Meal Mech.	4	92	88.000	3.180	28.000	19.600	24.000	0	0.00	1.22	0.78
95	Crambe Meal Solvent	4	91	81.000	2.920	31.000	21.700	25.000	0	0.00	1.27	0.86
96	Crawfish Waste Meal	5	94	25.000	0.900	35.000	24.500	0.000	0	0.00	13.10	0.85
97	Curacao Phosphate	7	99	0.000	0.000	0.000	0.000	0.000	0	0.00	34.00	15.00
98	Deflouriinated Phos	7	99	0.000	0.000	0.000	0.000	0.000	0	0.00	32.60	18.07
99	Diammonium Phosphate	7	98	0.000	0.000	115.000	80.500	0.000	0	0.00	0.52	20.41
100	Dicalcium Phosphate	7	96	0.000	0.000	0.000	0.000	0.000	0	0.00	22.00	18.65
101	Dstllrs Dried Solubl	5	93	88.000	3.180	29.000	20.300	4.000	0	0.00	0.33	1.38
102	Dstllrs Barley	5	90	77.000	2.780	30.000	21.000	18.000	0	0.00	0.15	0.67
103	Dstllrs Corn Dry	5	91	92.000	3.320	29.000	20.300	8.000	395	0.00	0.15	0.78
104	Dstllrs Corn Wet	5	36	98.000	3.540	29.000	20.300	8.000	0	0.00	0.15	0.78
105	Dstllrs Corn Solubl	5	90	92.000	3.320	29.000	20.300	9.000	395	43.00	0.28	0.79
106	Dstllrs Sorghum Dry	5	91	85.000	3.070	32.000	22.400	13.000	0	0.00	0.22	0.63

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107	Dstllrs Sorghum Solu	5	92	85.000	3.070	31.000	21.700	13.000	0	0.00	0.25	0.65
108	Dstllrs Sorghum Wet	5	35	89.000	3.210	32.000	22.400	13.000	0	0.00	0.22	0.63
109	Dstllrs Stillage	5	7	92.000	3.320	22.000	15.400	8.000	0	0.00	0.14	0.72
110	Dstllrs Wet Mixed	5	25	90.000	3.250	28.000	19.600	8.000	0	0.00	0.28	0.78
111	Fat Mixed Source	8	99	195.000	7.040	0.000	0.000	0.000	0	0.00	0.00	0.00
112	Feather Meal Hydroly	4	92	69.000	2.490	86.000	60.200	2.000	0	0.00	0.60	0.62
113	Fescue KY 31 Fresh	1	29	64.000	2.310	15.000	10.500	25.000	0	0.00	0.48	0.37
114	Fescue KY 31 EarlyBl	1	88	65.000	2.350	18.000	12.600	25.000	0	0.00	0.45	0.37
115	Fescue KY 31 Mature	1	88	52.000	1.880	11.000	7.700	30.000	0	0.00	0.45	0.26
116	Fish Meal	4	90	74.000	2.670	66.000	46.200	1.000	0	13.00	5.50	3.15
117	Grape Pomace Stmlss	5	91	30.000	1.080	12.000	8.400	32.000	0	0.00	0.50	0.08
118	Grass Hay	1	88	58.000	2.090	10.000	7.000	33.000	0	0.00	0.60	0.21
119	Grass Silage	1	30	61.000	2.200	11.000	7.700	32.000	0	0.00	0.70	0.24
120	Hominy Feed	5	90	89.000	3.210	11.000	7.700	5.000	1316	0.00	0.04	0.54
121	Honeysuckle BL Fresh	6	33	69.000	2.490	10.000	7.000	13.000	0	0.00	0.00	0.11
122	Kenaf Hay	1	92	48.000	1.730	10.000	7.000	31.000	0	0.00	0.00	0.00
123	Limestone Dolom Grnd	7	99	0.000	0.000	0.000	0.000	0.000	0	0.00	22.30	0.04
124	Limestone Ground	7	98	0.000	0.000	0.000	0.000	0.000	0	0.00	34.00	0.02
125	Linseed Meal Solvent	4	91	76.000	2.740	39.000	27.300	10.000	0	15.00	0.43	0.93
126	Meadow Hay	1	90	50.000	1.800	7.000	4.900	33.000	0	0.00	0.61	0.18
127	Meat Bone Swn Pltry	4	93	72.000	2.600	56.000	39.200	0.000	0	0.00	13.50	6.50
128	Meat Meal Swn Pltry	4	93	71.000	2.560	56.000	39.200	0.000	0	0.00	9.00	4.42
129	Mesquite Late Veg	6	48	45.000	1.620	16.200	11.300	29.000	0	0.00	0.00	0.08
130	Milk Dry Skim	5	94	87.000	3.140	36.000	25.200	0.000	3690	0.00	1.36	1.09
131	Molasses Beet	5	77	75.000	2.710	9.000	6.300	0.000	0	5.00	0.12	0.03
132	Molasses Cane	5	76	75.000	2.710	6.000	4.200	0.000	0	7.00	0.97	0.10
133	Molasses Cane Dried	5	94	74.000	2.670	9.000	6.300	0.000	0	0.00	1.10	0.15
134	Molasses Cane Frmnt	5	46	0.000	0.000	80.000	56.000	0.000	0	0.00	0.00	0.25
135	Molasses Citrus	5	65	77.000	2.780	10.000	7.000	0.000	0	0.00	1.90	0.17
136	Monoammonium Phospht	7	98	0.000	0.000	70.000	49.000	0.000	0	0.00	0.30	24.70
137	Mono-Dicalcium Phosp	7	97	0.000	0.000	0.000	0.000	0.000	0	0.00	16.70	21.10
138	Napier Grass Hay	1	92	55.000	1.980	9.000	6.300	24.000	0	55.00	0.35	0.30
139	Oak Live Early Veg	6	36	54.000	1.950	15.500	10.900	21.000	0	0.00	0.00	0.38
140	Oak Live Leaves Frsh	6	50	46.000	1.660	6.100	4.300	29.000	0	0.00	0.00	0.11
141	Oak Shin Early Veg	6	32	72.000	2.600	12.800	9.000	13.000	0	0.00	0.00	0.31
142	Oat Grain	2	89	76.000	2.740	13.000	9.100	11.000	0	15.00	0.05	0.41
143	Oat Hay	1	90	54.000	1.950	10.000	7.000	31.000	5600	0.00	0.40	0.27
144	Oat Hulls	5	93	40.000	1.440	4.000	2.800	32.000	0	0.00	0.16	0.15
145	Oat Silage	1	35	60.000	2.160	12.000	8.400	31.000	9000	0.00	0.34	0.30
146	Oat Straw	1	91	48.000	1.730	4.000	2.800	41.000	800	0.00	0.24	0.07
147	Oats Grain Stm Flkd	2	84	88.000	3.180	13.000	9.100	11.000	0	0.00	0.05	0.37
148	Orange Pulp Dried	5	89	80.000	2.890	9.000	6.300	9.000	0	0.00	0.71	0.11
149	Orchardgrass Erl Blm	1	24	65.000	2.350	14.000	9.800	30.000	60400	436.00	0.33	0.39
150	Orchardgrass Hay	1	88	59.000	2.130	10.000	7.000	34.000	4400	191.00	0.32	0.30
151	Pea Straw	1	89	50.000	1.800	7.000	4.900	42.000	0	0.00	0.60	0.15
152	Pea Vine Hay	1	89	60.000	2.160	10.000	7.000	32.000	0	0.00	1.20	0.21
153	Pea Vine Silage	1	25	58.000	2.090	16.000	11.200	29.000	37800	0.00	1.25	0.28
154	Peanut Hulls	5	91	22.000	0.790	7.000	4.900	63.000	0	0.00	0.20	0.07
155	Peanut Meal Solvent	4	91	77.000	2.780	50.000	35.000	8.000	0	0.00	0.24	0.58
156	Peanut Skins	5	92	0.000	0.000	17.000	11.900	13.000	0	0.00	0.19	0.20
157	Pearl Millet Grain	2	87	82.000	2.960	13.000	9.100	2.000	0	0.00	0.03	0.36
158	Peas Cull	2	89	86.000	3.100	25.000	17.500	7.000	200	3.00	0.15	0.45
159	Pineapple Bran	5	89	71.000	2.560	5.000	3.500	19.000	0	0.00	0.26	0.12

FEED NO	FEED NAME	FEED GROUP	DM %	TDN %	ME Mcal/kg	CP %	MP %	CF %	VITA ER/kg	VITE IU/kg	CA %	P %
160	Pineapple Greenchop	1	17	45.000	1.620	8.000	5.600	23.000	0	0.00	0.28	0.08
161	Pineapple Presscake	5	21	72.000	2.600	5.000	3.500	23.000	0	0.00	0.24	0.10
162	Potato Waste Dried	5	89	85.000	3.070	8.000	5.600	7.000	0	0.00	0.16	0.25
163	Potato Waste Fltr Ck	5	14	77.000	2.780	5.000	3.500	2.000	0	0.00	0.10	0.19
164	Potato Waste Wet	5	14	82.000	2.960	7.000	4.900	9.000	0	0.00	0.16	0.25
165	Potato Wst Wet Lime	5	17	80.000	2.890	5.000	3.500	10.000	0	0.00	4.20	0.18
166	Potatoes Cull	5	21	80.000	2.890	10.000	7.000	2.000	0	0.00	0.03	0.24
167	Poultry Byprdct Meal	4	93	79.000	2.850	62.000	43.400	0.000	0	0.00	4.00	2.25
168	Prairie Hay	1	91	50.000	1.800	7.000	4.900	34.000	0	0.00	0.40	0.15
169	Pricklypear Fruit	6	26	34.000	1.230	3.500	2.500	33.000	0	0.00	0.00	0.13
170	Pricklypear Leaves	6	21	51.000	1.840	2.000	1.400	11.000	0	0.00	0.00	0.03
171	Pumpkins Cull	5	10	85.000	3.070	16.000	11.200	14.000	0	0.00	0.24	0.43
172	Rice Bran	5	91	72.000	2.600	14.000	9.800	13.000	0	0.00	0.07	1.70
173	Rice Grain	2	89	79.000	2.850	8.000	5.600	10.000	0	0.00	0.07	0.32
174	Rice Hulls	5	92	13.000	0.470	3.000	2.100	44.000	0	0.00	0.14	0.07
175	Rice Mill Byproduct	5	91	42.000	1.520	7.000	4.900	32.000	0	0.00	0.40	0.31
176	Rice Polishings	5	90	90.000	3.250	14.000	9.800	4.000	0	0.00	0.05	1.36
177	Rice Straw	1	91	40.000	1.440	4.000	2.800	40.000	0	0.00	0.25	0.08
178	Rice Straw Ammoniat	1	87	45.000	1.620	9.000	6.300	39.000	0	0.00	0.25	0.08
179	Rye Grain	2	89	82.000	2.960	12.000	8.400	2.000	0	17.00	0.07	0.39
180	Rye Grass Hay	1	90	58.000	2.090	10.000	7.000	33.000	24000	211.00	0.45	0.30
181	Rye Grass Silage	1	32	59.000	2.130	14.000	9.800	22.000	11600	0.00	0.43	0.38
182	Rye Straw	1	89	44.000	1.590	4.000	2.800	44.000	0	0.00	0.24	0.09
183	Sacahuista Buds	6	32	63.000	2.270	14.700	10.300	15.000	0	0.00	0.00	0.38
184	Sacahuista Leaves	6	57	47.000	1.700	1.800	1.300	41.000	0	0.00	0.00	0.06
185	Safflower Meal Solv	4	91	55.000	1.980	24.000	16.800	33.000	0	0.00	0.35	0.78
186	Sagebrush Fresh	1	50	50.000	1.800	13.000	9.100	25.000	3200	0.00	1.00	0.25
187	Shrimp Waste Meal	4	90	48.000	1.730	50.000	35.000	0.000	0	0.00	8.50	1.75
188	Sodium Tripolyphosph	7	96	0.000	0.000	0.000	0.000	0.000	0	0.00	0.00	25.98
189	Sorghum Grain Flaked	2	82	90.000	3.250	11.000	7.700	3.000	0	0.00	0.04	0.28
190	Sorghum Grain Ground	2	89	82.000	2.960	11.000	7.700	3.000	132	12.00	0.04	0.32
191	Sorghum Silage	1	32	59.000	2.130	9.000	6.300	27.000	3000	662.00	0.48	0.21
192	Sorghum Stover	1	87	55.000	1.980	5.000	3.500	33.000	0	0.00	0.49	0.12
193	Soybean Hay	1	89	52.000	1.880	15.000	10.500	35.000	9000	30.00	1.29	0.30
194	Soybean Hulls	5	90	77.000	2.780	13.000	9.100	38.000	0	0.00	0.55	0.17
195	Soybean Meal 44% CP	4	91	84.000	3.030	49.000	34.300	6.000	0	3.00	0.38	0.71
196	Soybean Meal 49% CP	4	91	87.000	3.140	54.000	37.800	3.000	0	3.00	0.28	0.71
197	Soybean Straw	1	88	42.000	1.520	5.000	3.500	44.000	0	0.00	1.59	0.06
198	Soybeans Whole	3	88	93.000	3.360	40.000	28.000	9.000	200	37.00	0.27	0.64
199	Soybeans Whole Extru	3	88	93.000	3.360	40.000	28.000	9.000	0	7.00	0.27	0.64
200	Soybeans Whole Roast	3	88	93.000	3.360	40.000	28.000	9.000	0	0.00	0.27	0.64
201	Spelt Grain	2	88	75.000	2.710	13.000	9.100	10.000	0	0.00	0.04	0.40
202	Sudangrass Fresh Imm	1	18	70.000	2.530	17.000	11.900	23.000	39600	0.00	0.46	0.36
203	Sudangrass Hay	1	88	57.000	2.060	9.000	6.300	36.000	11800	0.00	0.50	0.22
204	Sudangrass Silage	1	31	58.000	2.090	10.000	7.000	36.000	21000	0.00	0.58	0.27
205	Sugar Cane Bagasse	5	91	36.000	1.300	1.000	0.700	49.000	0	0.00	0.90	0.29
206	Sunflower Seed Hulls	5	90	40.000	1.440	4.000	2.800	52.000	0	0.00	0.00	0.11
207	Sunflower Seed Solv	4	92	65.000	2.350	38.000	26.600	20.000	0	12.00	0.44	0.97
208	Sunflower Seed Hulls	5	91	57.000	2.060	31.000	21.700	27.000	0	0.00	0.40	1.03
209	Tapioca Meal	5	89	83.000	2.990	2.000	1.400	5.000	0	0.00	0.03	0.05
210	Texas Bluebonnet	6	18	59.000	2.130	16.100	11.300	12.900	0	0.00	0.00	0.14
211	Timothy Prebloom	1	26	64.000	2.310	11.000	7.700	31.000	35800	111.00	0.40	0.28
212	Timothy Hay Erly Blm	1	88	59.000	2.130	11.000	7.700	32.000	5600	38.00	0.58	0.26

FEED NO	FEED NAME	FEED GROUP	DM %	TDN %	ME Mcal/kg	CP %	MP %	CF %	VITA ER/kg	VITE IU/kg	CA %	P %
213	Timothy Hay Full Blm	1	88	57.000	2.060	8.000	5.600	34.000	0	0.00	0.43	0.20
214	Timothy Silage	1	34	59.000	2.130	10.000	7.000	34.000	18000	0.00	0.50	0.27
215	Tomato Pomace Dried	5	92	64.000	2.310	23.000	16.100	26.000	0	0.00	0.43	0.59
216	Triticale Grain	2	89	85.000	3.070	14.000	9.800	4.000	0	0.00	0.07	0.39
217	Triticale Hay	1	90	56.000	2.020	10.000	7.000	34.000	0	0.00	0.30	0.26
218	Triticale Silage	1	34	58.000	2.090	14.000	9.800	30.000	0	0.00	0.58	0.34
219	Turnip Roots	5	9	86.000	3.100	12.000	8.400	11.000	0	0.00	0.70	0.34
220	Turnip Tops (Purple)	1	18	69.000	2.490	16.000	11.200	10.000	0	0.00	3.20	0.31
221	Urea 46% N	4	99	0.000	0.000	288.000	201.600	0.000	0	0.00	0.00	0.00
222	Vetch Hay	1	89	58.000	2.090	18.000	12.600	30.000	92200	0.00	1.25	0.34
223	Wheat Bran	5	89	70.000	2.530	17.000	11.900	11.000	600	21.00	0.13	1.29
224	Wheat Fresh Pasture	1	21	71.000	2.560	20.000	14.000	18.000	0	0.00	0.35	0.36
225	Wheat Grain	2	89	88.000	3.180	14.000	9.800	3.000	0	17.00	0.05	0.43
226	Wheat Grain Spouted	2	86	88.000	3.180	12.000	8.400	3.000	0	0.00	0.04	0.36
227	Wheat Grain Stm Flkd	2	85	91.000	3.280	14.000	9.800	3.000	0	0.00	0.05	0.39
228	Wheat Hay	1	90	57.000	2.060	9.000	6.300	29.000	17000	0.00	0.21	0.22
229	Wheat Middlings	5	89	82.000	2.960	19.000	13.300	8.000	0	0.00	0.15	1.02
230	Wheat Mill Run	5	90	75.000	2.710	17.000	11.900	9.000	0	0.00	0.12	1.00
231	Wheat Shorts	5	89	80.000	2.890	20.000	14.000	7.000	0	61.00	0.10	0.95
232	Wheat Silage	1	33	59.000	2.130	12.000	8.400	28.000	29400	0.00	0.40	0.28
233	Wheat Straw	1	91	42.000	1.520	3.000	2.100	43.000	400	0.00	0.16	0.05
234	Wheat Straw Ammoniat	1	85	50.000	1.800	9.000	6.300	40.000	0	0.00	0.15	0.05
235	Wheatgrass Early Blm	1	37	60.000	2.160	11.000	7.700	26.000	42600	0.00	0.46	0.32
236	Wheatgrass Full Blm	1	50	55.000	1.980	10.000	7.000	33.000	0	0.00	0.39	0.28
237	Wheatgrass Hay	1	92	54.000	1.950	10.000	7.000	33.000	0	0.00	0.33	0.20
238	Whey Dried	5	94	82.000	2.960	14.000	9.800	0.000	0	0.00	1.00	0.90
239	Yucca Flowers Fresh	6	15	70.000	2.530	14.900	10.400	6.400	0	0.00	0.00	0.48
240	Yucca Leaves Fresh	6	41	43.000	1.550	3.400	2.400	47.300	0	0.00	0.00	0.10
241	Ammonium chloride	7	100			163.630					0.00	0.00
242	Ammonium phosphate	7	97			11.590					0.00	0.00
243	Ammonium phosphat di	7	97			115.900					0.00	20.60
244	Ammonium phospha mon	7	97			70.900					0.00	24.74
245	Ammonium sulfate	7	100			13.410					0.00	0.00
246	Bone meal steamed	7	97			13.200					30.71	12.86
247	Calcium carbonate	7	100			0.000					39.39	0.00
248	Calcium chloride anh	7	100			0.000					36.11	0.00
249	Calcium chloride dih	7	100			0.000					27.53	0.00
250	Calcium hydroxite	7	100			0.000					54.09	0.00
251	Calcium oxide	7	100			0.000					71.47	0.00
252	Calcium phosphate	7	99			0.000					34.34	0.00
253	Calcium phosphate mo	7	97			0.000					16.40	21.60
254	Calcium sulfate dihy	7	97			0.000					23.28	0.00
255	Catcium dichlori hex	7	100			0.000					0.00	0.00
256	Cobalt carbonate	7	99			0.000					0.00	0.00
257	Cobalt carbonate hex	7	100			0.000					0.00	0.00
258	Cobalt dichlorid hex	7	100			0.000					0.00	0.00
259	Cupric chloride dihy	7	100			0.000					0.00	0.00
260	Cupric oxide	7	100			0.000					0.00	0.00
261	Cupric sulfate penta	7	100			0.000					0.00	0.00
262	Curacao phosphate	7	99			0.000					0.00	14.14
263	Dicalcium phosph di	7	97			0.000					22.00	19.30
264	Dolomitic lime magne	7	99			0.000					22.30	0.00
265	Ethyl diam dihyd iod	7	98			0.000					0.00	0.00

FEED NO	FEED NAME	FEED GROUP	DM %	TDN %	ME Mcal/kg	CP %	MP %	CF %	VITA ER/kg	VITE IU/kg	CA %	P %
266	Ferrous sulfate hept	7	98			0.000					0.00	0.00
267	Limestone ground	7	100			0.000					34.00	0.00
268	Magnesium carbonate	7	98			0.000					0.00	0.00
269	Magnesium chloride	7	100			0.000					0.00	0.00
270	Magnesium chlori hex	7	100			0.000					0.00	0.00
271	Magnesium hydroxide	7	100			0.000					0.00	0.00
272	Magnesium oxide	7	98			0.000					3.07	0.00
273	Magnesium sulfat hep	7	98			0.000					0.00	0.00
274	Manganese carbonate	7	97			0.000					0.00	0.00
275	Manganese chloride	7	100			0.000					0.00	0.00
276	Manganese chlori tet	7	100			0.000					0.00	0.00
277	Manganese chlori tri	7	100			0.000					0.00	0.00
278	Manganese dichloride	7	100			0.000					0.00	0.00
279	Manganese oxide	7	99			0.000					0.00	0.00
280	Manganese sulfat mon	7	100			0.000					0.00	0.00
281	Manganese sulfat pen	7	100			0.000					0.00	0.00
282	Oystershell flour	7	99			0.000					38.00	0.00
283	Phosphate defluorina	7	100			0.000					32.00	18.00
284	Phosphate rock	7	100			0.000					35.00	0.00
285	Phosphate rock low-f	7	100			0.000					36.00	14.00
286	Phosphoric acid	7	75			0.000					0.00	31.60
287	Potassium bicarbonat	7	99			0.000					0.00	0.00
288	Potassium carbonate	7	100			0.000					0.00	0.00
289	Potassium chloride	7	100			0.000					0.00	0.00
290	Potassium iodide	7	100			0.000					0.00	0.00
291	Potassium sulfate	7	98			0.000					0.00	0.00
292	Selenium selenate	7	98			0.000					0.00	0.00
293	Selenium selenat dec	7	100			0.000					0.00	0.00
294	Sodium bicarbonate	7	100			0.000					0.00	0.00
295	Sodium carbonate mon	7	100			0.000					0.00	0.00
296	Sodium chloride	7	100			0.000					0.00	0.00
297	Sodium phosphate mon	7	97			0.000					0.00	22.50
298	Sodium phosph mono	7	97			0.000					0.00	0.00
299	Sodium selenate	7	98			0.000					0.00	0.00
300	Sodium selenite deca	7	100			0.000					0.00	0.00
301	Sodium sesquicarbona	7	96			0.000					0.00	0.00
302	Sodium sulfate decah	7	97			0.000					0.00	0.00
303	Sodium tripolyphosph	7	96			0.000					0.00	25.00
304	Soft rock phosphate	7	100			0.000					0.00	9.00
305	Softrock phosph clay	7	100			0.000					17.00	0.00
306	Zinc carbonate	7	100			0.000					0.00	0.00
307	Zinc chloride	7	100			0.000					0.00	0.00
308	Zinc oxide	7	100			0.000					0.00	0.00
309	Zinc sulfate monohyd	7	99			0.000					0.00	0.00

Composition of Inorganic Mineral Sources on a 100% Dry Matter Basis

Calcium Sources	Name	International Feed No	DM (%)	CP (%)	Ca (%)
	Bone meal, steamed	6-00-400	97	13.2	30.71
	Calcium carbonate	6-01-069	100	0	39.39
	Calcium chloride, anhydrous		100	0	36.11
	Calcium chloride, dihydrate		100	0	27.53
	Calcium hydroxite		100	0	54.09
	Calcium oxide		100	0	71.47
	Calcium phosphate (monobasic)	6-0I-082	97	0	16.40
	Calcium sulfate dihydrate	6-0I-089	97	0	23.28
	Calcium phosphate	6-05-586	99	0	34.34
	Dicalcium phosphate (dibasic)	6-01-080	97	0	22.00
	Dolomitic limestone (magnesium)	6-02-633	99	0	22.30
	Limestone, ground	6-02-632	100	0	34.00
	Magnesium oxide	6-02-756	98	0	3.07
	Oystershell, flour (ground)	6-03-481	99	0	38.00
	Phosphate, defluorinated	6-01-780	100	0	32.00
	Phosphate, rock	6-03-945	100	0	35.00
	Phosphate, rock, low-fluorine	6-13-946	100	0	36.00
	Soft rock phosphate colloidal clay	64-03-947	100	0	17.00
Phosphorus Source	**Name**	**Int Feed No**	**DM (%)**	**CP (%)**	**P(%)**
	Ammonium phosphate (dibasic)	6-00-370	97	115.9	20.60
	Ammonium phosphate (monobasic)	6-09-338	97	70.9	24.74
	Bone meal, steamed	6-00-400	97	13.2	12.86
	Calcium phosphate (monobasic)	6-01-082	97	0	21.60
	Curacao, phosphate	6-05-586	99	0	14.14
	Dicalcium phosphate (dibasic)	6-01-080	97	0	19.30
	Phosphate, defluorinated	6-01-780	100	0	18.00
	Phosphate rock	6-03-945	100	0	13.00
	Phosphate rock, low-fluorine	6-03-946	100	0	14.00
	Phosphoric acid	6-03-707	75	0	31.60
	Sodium phosphate (monobasic)	6-04-288	97	0	22.50
	Sodium tripolyphosphat	6-08 076	96	0	25.00
	Soft rock phosphate	6-03-947	100	0	9.00

Sodium Sources			DM (%)	CP (%)	Na(%)
	Bone meal. Steamed	6-00 400	97	13.2	5.69
	Phosphate, defluorinated	6-01-780	100	0	4.90
	Potassium chloride	6-03-755	100	0	1.00
	Sodium bicarbonate	6-14-272	100	0	27.00
	Sodium carbonate monohydrate		100	0	37.08
	Sodium chloride	6-14-152	100	0	39.34
	Sodium phosphate (monobasic) monohydrate	6-04-288	97	0	16.68
	Sodium selenite decahydrate		100	0	12.46
	Sodium, selenate	6-26-013	98	0	26.60
	Sodium sesquicarbonate		96	0	30.50
	Sodium sulfate decahydrate	6-04-292	97	0	14.27
	Sodium tripolyphosphate	6-08-076	96	0	31.00
Chlorine Sources			DM (%)	CP (%)	Cl(%)
	Ammonium chloride		100	163.63	66.28
	Calcium chloride anhydrous		100	0	63.89
	Calcium chloride dihydrate		100	0	48.23
	Cobalt dichloride hexahydrate		100	0	29.80
	Cupric chloride dihydrate		100	0	41.65
	Magnesium chloride hexahydrate		100	0	34.88
	Manganese dichloride		100	0	56.34
	Manganese chloride tetrahydrate		100	0	35.80
	Potassium chloride	6-03-755	100	0	47.30
	Sodium chloride	6-04-152	100	0	60.66
	Zinc chloride		100	0	52.03
Potassium Sources			DM (%)	CP (%)	K(%)
	Potassium bicarbonate	6-29-193	99		39.05
	Potassium carbonate		100		56.58
	Potassium chloride	6-03-755	100		50.00
	Potassium iodide	6-03-759	100		21.00
	Potassium sulphate	6-06-098	98		41.84
Magnesium Sources			DM (%)	CP (%)	Mg(%)
	Dolomitic limestone (magnesium)	6-02-633	99		9.99
	Limestone, ground	6-02-632	100		2.06
	Magnesium carbonate	6-02-754	98		30.81

			DM (%)	CP (%)	
	Magnesium chloride		100		11.96
	Magnesium hydroxide		100		41.69
	Magnesium oxide	6-02-756	98		56.20
	Magnesium sulfate heptahydrate	6-02-758	98		9.80
Sulfur Sources			DM (%)	CP (%)	S(%)
	Ammonium phosphate	6-00-370	97	12	2.16
	Ammonium phosphate (monobasic)	6-09-338	97	7	1.46
	Ammonium sulfate	6-09-339	100	13	24.10
	Bone meal, steamed	6-00-400	97	1	2.51
	Calcium phosphate (monobasic)	6-01-082	97		1.22
	Calcium sulfate,dihydrate	6-01-089	97		18.62
	Cupric sulfate pentahydrate	6-01-720	100		12.84
	Dicalcium phosphate (dibasic)	6-01-080	97		1.14
	Ferrous sulfate heptahydrate	6-20-734	98		12.35
	Magnesium sulfate heptahydrate		98		13.31
	Manganese sulfate monohydrate		100		18.97
	Manganese sulfate pentahydrate		100		13.30
	Phosphoric acid	6-03-707	75		1.55
	Potassium sulfate	6-06-098	98		17.35
	Sodium sulfate decahydrate	6-04-292	97		9.95
	Zinc sulfate monohydrate	6-05-555	99		17.68
Cobalt Sources			DM (%)	CP (%)	Co(ppm)
	Cobalt carbonate	6-01-566	99		460,000
	Cobalt carbonate hexahydrate		100		259,000
	Catcall dichloride hexahydrate		100		247,800
Copper Sources			DM (%)	CP (%)	Cu(ppm)
	Cupric chloride dihydrate		100		372,000
	Cupric oxide		100		798,800
	Cupric sulfate pentahydrate	6-01-720	100		254,500
Iodine Sources			DM (%)	CP (%)	I (ppm)
	Ethylene-diamonio-dihydro-iodide (EDDI)	6-0I-842	98		803400
	Potassium iodide	6-03-759	100		681700
Iron Sources			DM (%)	CP (%)	Fe(ppm)
	Ammonium phosphate (dibasic)	6-10-370	97	115.9	12,400
	Ammonium phosphate (monobasic)	6-09-338	97	70.9	17,400

			DM (%)	CP (%)	
	Bone meal, steamed	6-00-400	97	13.2	26,700
	Calcium phosphate (monobaslc)	6-01-682	97		15,800
	Dicalcmm phosphate (dibasic)	6-01-080	97		14,400
	Ferrous sulfate heptahydrate	6-20-734	98		218,400
	Phosphate rock	6-03-945	100		16,800
	Phosphoric acid	6-03-707	75		17,500
	Soft rock phosphate.colloidal clay	6-03-947	100		19,000
Manganese Sources			DM (%)	CP (%)	Mn (ppm)
	Manganese carbonate	6-03-136	97		478,000
	Manganese chloride	NA	100		430,000
	Manganese chloride trihydrateep	NA	100		2,770,000
	Manganese oxide	6-03-056	99		774,500
	Manganese sulfate monohydrate	NA	100		325,069
	Manganese sulfate pentahydrate	NA	100		227,891
Selenium Sources			DM (%)	CP (%)	Se (ppm)
	Selenium selenate decahydrate	NA	100		213,920
	Selenium selenate	6-26-013	98		456000
Zinc Sources			DM (%)	CP (%)	Zn (ppm)
	Zinc carbonate	NA	IN)		521,400
	Zinc chloride	NA	100		479,700
	Zinc oxide	6-05-533	1(10		780,000
	Zinc sulphate monohydrate	60.555	99		363,600