



Current Report

Cooperative Extension Service • Division of Agriculture • Oklahoma State University

VisiCalc® Program for Calculating Nutrient Requirements for Beef Cattle

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OSU HAYVALUE is the filename of a spreadsheet program designed to calculate the daily requirements for Crude Protein, Digestible Protein, Total Digestible Nutrients (TDN), Calcium and Phosphorus for cows, steers or heifers. These requirement values, like those shown in most tables, should be valid for cattle in good body condition in non-stressful weather conditions. Cold and/or wet weather can dramatically increase the energy (TDN) requirements of cattle and energy intake should be increased accordingly. After nutrient composition values for a hay or other forage source are entered, the program calculates the pounds of the hay necessary to meet the animal's nutrient requirements. In addition, when the pounds of the hay to be fed per day and the percent of protein in the supplement are entered, the program calculates the pounds of supplement needed to meet the animal's protein requirement.

Using the Program

To use this template the user must purchase the spreadsheet software and become familiar with its use. The program may be keyed in using the equations and format shown in this current report or the program may be purchased from OSU for certain models of microcomputers. Consult your county extension director for details.

The program is divided into 6 sections. Section 1 allows the input of the type of hay or forage, the date and the name and address of the owner. This section is primarily designed for use by extension specialists who advise a large number of producers.

Section 2 allows the user to describe the kind of cattle to be fed. If cows are to be fed, a 0 (Zero) is entered in the space for "class of cattle." If stockers are to be fed, a 1 (one) is entered for "class of cattle." If cows are to be used, the weight, expected milk production per day and the expected butterfat of the milk is entered. Typical beef cows will give between 8 and 15 lbs. of milk per day and some dual purpose and dairy crossbreeds will give up to 22 or 23 lbs. per day. Typically the butterfat content of beef breeds is between 2.0 and 3.0%. If stockers are to be evaluated, the sex of the calf (0 for heifer; 1 for steer) is entered along with the weight of the calf and the desired rate of gain.

In section 3, the daily requirements for Crude Protein, Digestible Protein, TDN, Calcium and Phosphorus are calculated by the program.

Section 4 allows the user to enter data from a forage analysis. If some of the data, phosphorus for example, is unavailable, a 0 (zero) is entered in the appropriate location. Note that all forage analyses are to be entered on a dry matter basis.

Section 5 computes the pounds of hay needed to meet each of the requirements for Protein, energy and minerals. The pounds of hay needed are stated on an as fed basis. If the pounds of hay needed to meet any nutrient requirement are above the amount of hay than can be consumed or that can economically be fed, some type of supplement will need to be considered or a different hay will need to be considered.

Section 6 estimates the pounds of a given supplement that will be needed to meet the Crude Protein requirement of the animal. The user enters the pounds of hay that will be fed each day and the % Crude Protein in the intended supplement. The program calculates the pounds of protein supplied by the stated amount of hay, compares that value to the daily requirement, and calculates the pounds of supplement necessary to meet the Crude Protein Requirement. With a little practice with spreadsheets, the user can easily modify this section to calculate the amount of supplement needed to meet other requirements such as Digestible Protein, TDN, Calcium or Phosphorus. Crude Protein was chosen in this case because it is usually the first limiting nutrient in many hays.

The screen display for this program is shown in Table 1 and a listing of program statements is shown in Appendix 1 with heading statements deleted to save space on this publication. The format for entering equations will vary from spreadsheet to spreadsheet and users with spreadsheets other than Visicalc[®] may need to alter some format statements and, in some cases, may need to change the order of equations. Please note that several equations are entered in columns to the right of the "H" column and will not appear on the screen. This is done to leave the screen as uncluttered as possible.

Appendix 1. Listing of program statements for OSU HAYVALUE with heading statements deleted.

```
>F37:/F$(A21-F36)/(F35/100)
>F36:/F$(F34*(A26/100)*B26/100)
>E31:/F$((E21/(N26/100))*N27)/(A26/100)
>D31:/F$((D21/(M26/100))*M27)/(A26/100)
>C31:/F$((C21/(L26/100))*L27)/(A26/100)
>B31:/F$((B21/(K26/100))*K27)/(A26/100)
>A31:/F$((A21/(J26/100))*J27)/(A26/100)
>I28:(.929*B26)-3.48
>N27:@IF(F26>=.001,1,0)
>M27:@IF(E26>=.001,1,0)
>L27:@IF(D26>=.001,1,0)
>K27:@IF(C26>=.001,1,0)
>J27:@IF(B26>=.001,1,0)
>I27:@IF(A26>=.001,1,0)
>N26:@IF(F26=0,1,F26)
>M26:@IF(E26=0,1,E26)
>L26:@IF(D26=0,1,D26)
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>K26:@IF(C26=0,1,C26
>J26:@IF(B26=0,1,B26
>I26:@IF(A26=0,1,A26
>F26:/F$0
>E26:/F$0
>D26:/F$39
>C26:/F$4
>B26:/F$6
>A26:/F$89
>E21:/F$@IF(F15=0,M17,M18)
>D21:/F$@IF(F15=0,L17,L18)
>C21:/F$@IF(F15=0,K17,K18)
>B21:/F$@IF(F15=0,J17,J18)
>A21:/F$@IF(F15=0,I17,I18)
>M18:/F$((2*(L13*4.54))+(19.6*G13*.35)/454)
>L18:/F$((L13*4.54)+((1.7*19.6*G13*.35))/454)
>K18:/F$@IF(E13=1,N16,O16)
>J18:/F$+L14+M14
>I18:/F$+L13+M13
>M17:/F$(I16+J16)*1.1
>L17:/F$(I15+J15)*1.1
>K17:/F$(I14+K14)*1.1
>J17:/F$+I17*.59
>I17:/F$(I13+K13)*1.05
>O16:(M16/.61)+(M15/.34)/1.64
>N16:(L16/.61)+(L15/.34)/1.64
>M16:(.077*(F13*.454)^.75)
>L16:(.077*(F13*.454)^.75)
>J16:(.0000216*A13)+.00836
>I16:+B13*((.00011*C13)+.00139)
>M15:(.05603*O14)+(.01265*(O14^2))*(N14^.75)
>L15:(.05272*L14)+(.00684*(L14^2))*(N14^.75)
>J15:(.000027*A13)+.0102
>I15:+B13*((.0002*C13)+.0019)
>O14:+G13*.454
>N14:+F13*.454
>M14:.4*G13
>L14:(.0033*(F13^.75)
>K14:+J14*B13
>J14:(.0423*C13)+.155
>I14:(.00545*A13)+2.135
>M13:.55*G13
>L13:/F$((.0047*(F13^.75)
>K13:+J13*B13
>J13:(.0104*C13)+.0459
>I13:(.00056*A13)+.3317
>G13:1.1
>F13:331
>E13:0
>D13:/F$
>C13:/F$3
>B13:/F$11
>A13:1000
/W1
/GOR
/GRM
/GC9
/X>A1:>A1:

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Table 1.

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      [ A ][ B ][ C ][ D ][ E ][ F ][ G ]
1>HAYVALUE
2>PROGRAM FOR CALCULATION OF HAY VALUE
3>
4>OWNER NAME           KIND OF HAY           DATE           ADDRESS
5>JOE FARMER           BERMUDA             AUG 8, 83      SOMEWHERE
6>
7>
8>ANIMAL DATA (ENTER)
9>           COWS                STOCKERS
10>                SEX                AVE.
11> WEIGHT  MILK/DAY  MILKFAT          1= STEER          DAILY
12>  (LB)    (LB)     (%)             0= HEIFER        WEIGHT           GAIN
13> 1000    11.00    3.00             0                331             1.1
14>
15>CLASS OF CATTLE (COWS = 0, STOCKERS = 1 >>>>)           1<<<<<<<<
16>
17>
18>DAILY REQUIREMENTS, LB/DAY (CALCULATED)
19>  CRUDE      DIG.
20> PROTEIN  PROTEIN    TDN    CALCIUM    PHOS
21>  0.97     0.70     5.70    0.03     0.02
22>
23>HAY DATA, % ON DRY BASIS (ENTER)
24>  DRY      CRUDE      DIG.
25> MATTER  PROTEIN  PROTEIN    TDN    CALCIUM    PHOS
26> 89.00    6.00    4.00     39.00    0.00     0.00
27>
28>POUNDS OF HAY NEEDED TO MEET REQUIREMENTS (CALCULATED)
29>  CRUDE      DIG
30> PROTEIN  PROTEIN    TDN    CALCIUM    PHOS
31> 18.16    19.55    16.42    0.00     0.00
32>
33>SUPPLEMENT NEEDED TO MEET PROTEIN REQUIREMENT
34>POUNDS OF HAY YOU WILL FEED/DAY (ENTER)           10.00
35>% CRUDE PROTEIN IN SUPPLEMENT (ENTER)           20.00
36>POUNDS OF PROTEIN FROM HAY (CALCULATED)           0.53
37>POUNDS OF SUPPLEMENT NEEDED (CALCULATED)         2.18
38>
39>TO PRINT PROGRAM 1, MOVE CURSOR TO A1 AND KEY H60 <ENTER>
40>
41>Developed by Dr. Keith Lusby, Extension Beef Cattle Specialist,
42>   Okla. St. Univ. and Frank Bates, Area Specialized Agent,
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