Current Report

Calculation of Complete Diets For SWINE and Checking For Nutrient Balance (NEWSWINE)

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The program has two functions. The first is to calculate the nutritional composition of a feed mixture. The second is to look up some of the nutritional requirements of swine. Using the two functions together it is possible to develop a ration which is correctly balanced for a specific weight and type of swine. The top screen will hold up to 10 feed ingredients and their nutrient composition. The as fed composition of the ration is entered by the user in the "C" column. It is not necessary for the total amount of feed entered in the C column to add to 100. This program can calculate the nutrient composition on any amount of feed (for example 13.5 lbs, 100 lbs, or 2000 lbs). The first screen output is

shown below. The type of animal for which the feed is being formulated is selected from Table 2, ie Class 3, in the example and entered in cell C20. The user of the program need only change the feeds or the makeup of feeds to bring the amount of each nutrient up to the level of the requirement. A label will indicate if a nutrient is deficient (DFN) or adequate (ADQ).

Obtaining nutritional balance by trial and error can become very fast and efficient as the user develops an intuitive feeling as to the affects of an increase or decrease in the concentration of a need on the nutrient levels in the ration. With the advent of the microcomputer and spreadsheets, these formerly time consuming chores become very quick

FEED NAME	AMOUNT	FIB	M.E.	CA.	PHOS	C.P.	LYS.	TRYPT	THREO
CORN, YELLOW	1559	2.5	1550	0.02	0.25	8.80	0.24	0.09	0.32
SOYBEAN MEAL 44	390	7.3	1460	0.30	0.60	44.00	2.90	0.63	1.70
CALCIUM CARB	15			38.00					
DICALCIUM PHOS	26			22.00	18.50				
SALT	7								
VITAMIN TM MIX	3								

	IN FEED	REQUIRED		IN FEED	REQUIRED
BATCH SIZE	2000		LYSINE %	0.75	0.75 ADQ
CRUDE FIBER %	3.37		TRYPTOPHANE %	0.19	0.15 ADQ
ME Kcal/lb.	1492.	1400 ADQ	THREONINE %	0.58	0.50 ADQ
CALCIUM %	0.65	0.65 ADQ	METHONINE+CYSTINE%	0.54	0.50 ADQ
PHOSPHORUS %	0.55	0.55 ADQ	COST PER CWT $		
CRUDE PROTEIN %	15.44	15.30 ADQ	COST PER BATCH $		
CLASS————>>>	3	41-125 # PIG			

and easy. This swine ration balancing spreadsheet was written for Lotus 123 or can be obtained from OSU compiled for use without spreadsheet software.

Four different Macro programs have been incorporated to aid the user of this program. The first of these activated by simultaneously pressing the Alt and S keys allows **SELECTION** of feeds to use in the program. The feeds included with the program are shown in Table 1. If these feeds and the nutrient composition are okay, write down the numbers of the feeds you wish to use and then press the "HOME" key on your computer. This should place the cursor in cell A1. Type the numbers of the feeds you want to use starting in cell A2. Zero placed in column A rows 2-11 will blank out the feed name and data on rows not used.

The next important function after the feeds are selected is the **FORMULATE** command. To activate press simultaneously Alt and F. This command will place the cursor in cell C1 and will place a title lock on the feed names so that the user can scroll to the right to check nutrient composition of the feeds selected. If nutrient values must be changed the changes must be made in the feed library to reach these use

the **EDIT** function (Alt E). If you need to add a feed not in the reference area first use the **SELECTION** command and type the new feed name next to an unused number. Then use the **EDIT** to enter the nutrient coefficients. When completed use the **FORMULATE** command which will place the cursor in column C. The amounts of each feed selected for your ration are entered in the appropriate row in column C.

There are a large number of calculations hidden off to the right of the screen. This portion of the program contains nutrient totals. In the example ration supplied with this program the user can see that of the 15.44 percent protein in the ration, 6.86 units came from corn and 8.58 units came from soybean meal (column S). These cells should never be altered because they contain necessary intermediate steps for computing the ration. Any cell that should not be changed is protected to prevent inadvertent removal of an equation.

There is important information about the animal for which the nutrient requirements are being evaluated at the bottom of the screen. These are the OSU or the NRC recommendations for the animal described. The status of each nutrient is shown to the right of the requirement.

Table 1. Feed List.

	FEED NAME	C.F.%	M.E.	CA.	PHOS	C.P.	LYS.	TRYPT	THREO	MET+CY
1	ALFALFA HAY	29.00	800	1.20	0.20	14.00	0.55	0.25	0.50	0.35
2	ALFALFA DEHY	24.00	775	1.40	0.23	17.00	0.80	0.34	0.70	0.56
3	BARLEY	6.00	1380	0.05	0.34	11.50	0.40	0.15	0.36	0.37
4	BLOOD MEAL F. D.	1.00	1200	0.40	0.30	86.00	7.00	1.00	3.60	2.00
5	CORN, YELLOW	2.50	1550	0.02	0.25	8.80	0.24	0.09	0.32	0.40
6	FAT	—	3585	—	—	—	—	—	—	—
7	FISH MEAL MENH	0.90	1500	5.20	2.88	61.00	4.75	0.65	2.50	2.33
8	LYSINE 78	—	—	—	—	—	78.00	—	—	—
9	M B MEAL, 50	2.80	1035	9.40	4.58	50.00	2.80	0.28	1.60	1.14
10	MILK, DRY SKIM	—	1620	1.25	1.00	33.00	2.50	0.45	1.57	1.30
11	MUNG BEANS	3.90	1529	0.14	0.46	26.20	1.75	0.20	0.80	0.41
12	OATS	10.70	1240	0.08	0.33	11.80	0.40	0.14	0.38	0.37
13	OAT GROATS	2.50	1550	0.07	0.40	15.80	0.50	0.18	0.44	0.41
14	PEANUT MEAL, SOL	9.90	1320	0.27	0.61	49.00	1.45	0.48	1.37	1.17
15	PLASMA PROTEIN	0.30	1500	0.14	0.13	70.00	6.10	1.33	4.13	2.77
16	RICE BRAN	12.90	1300	0.11	1.37	14.00	0.61	0.21	0.55	0.47
17	SORGHUM GRAIN	2.20	1480	0.02	0.27	8.90	0.22	0.09	0.27	0.29
18	SOYBEAN MEAL 44	7.30	1460	0.30	0.60	44.00	2.90	0.63	1.70	1.18
19	SOYBEAN MEAL 48	3.40	1535	0.20	0.65	48.00	3.12	0.64	1.90	1.41
20	SUGAR	—	1383	—	—	—	—	—	—	—
21	TANKAGE, 60%	2.00	980	4.60	2.50	60.00	3.80	0.58	2.48	1.25
22	WHEAT, HARD WR	2.60	1475	0.05	0.30	12.20	0.38	0.17	0.37	0.50
23	WHEAT BRAN	11.00	980	0.13	1.15	15.00	0.56	0.25	0.41	0.43
24	WHEAT MIDDS	7.50	1340	0.13	0.80	16.00	0.68	0.19	0.54	0.41
25	WHEY, DRIED	—	1405	0.85	0.70	13.00	0.90	0.17	0.80	0.49
26	CALCIUM CARB	—	—	38.00	—	—	—	—	—	—
27	DICALCIUM PHOS	—	—	22.00	18.50	—	—	—	—	—
28	DI MONO PHOS	—	—	16.50	21.00	—	—	—	—	—
29	SALT	—	—	—	—	—	—	—	—	—
30	VITAMIN TM MIX	—	—	—	—	—	—	—	—	—

Nutrient Levels

The suggested nutrient levels of swine rations for the different classes of swine in the "New Swine" program are presented in Table 2. These are guidelines only. The levels may vary depending on the grain, protein source and other ingredients used.

It is critical that the suggested levels for the amino acids e.g. lysine, tryptophan, threonine and methionine + cystine be met. With some grain and protein sources, it will require more protein than is suggested in Table 2 in order to meet the pigs amino acid requirement, especially lysine.

If synthetic lysine is added to the ration, it is possible to lower the crude protein level 2% for Class 3 (41 to 125 lb. pigs) and 1% for Class 2 (26-40 lb. pigs), Class 4 (126 lb and up pigs) and Class 5 (sows and boars) if the lysine requirement is met.

For fast growing, extremely lean pigs lysine levels may need to be increased to 0.80% for pigs weighing 41 to 125 lb and 0.65% for pigs weighing 126 pounds and up.

In this program the nutrient requirements are looked up in the table (N19..X23). To make the program easier to use, the user need only get protein percentage within 0.10 of the requirement to avoid the "deficient DFN" status label. Other nutrients have a tolerance of 0.005 the deficient status label. In many cases it will not be possible or wise not allow many of the nutrients to be present in amounts in excess of the minimum requirements. Experience will allow the user to anticipate limiting nutrients in a short period of time. Deficiencies will usually lead to reduced performance.

The feeds shown in this example were chosen because they are familiar to most Oklahoma producers. The coefficients may not be correct for your feeds and analysis of your feeds is suggested. Any of these feeds that are not used can be replaced with a feed useful to you.

In order to speed operations, if you have a slow computer you may want to set the program "manual recalculation".

The keystroke sequence is /WGRM. This permits the user to make any number of changes in feeds and nutrients before the program calculates the ration. When the user is ready to calculate the ration, the "F9" function key is pressed. The program will flash "wait" in the upper right hand corner of the screen while it is calculating. Users with faster computers will want to use the automatic default and let the computer recalculate after each keyboard entry. To reset to automatic the keystroke sequence is /WGRA.

Helpful Hint: Often this program is more readable if the user uses the zero suppression option (**ALT Z**).

Calculating a Ration

Rations are calculated by trial and error. Although this may seem crude, the speed of the computer makes this relatively efficient.

First, press Alt F keys to move the cursor to the top left hand corner of the screen. Next, check the nutrients in the selected feeds. If they need to be changed to correctly represent the feeds you are using EDIT (Alt E). New feeds can be added by using the **SELECT** (ALT S) option. Be sure to enter new nutrient data for the new feed. Note that cost of each ingredient is entered in terms of **$/hundred weight on an as fed basis,** the way most feeds would be quoted from a feed store.

Next, enter your initial "guesses" for percentages of each ingredient to be used in the ration. The total does not need to add to 100 for calculation of the ration, but keeping the total at 100 may make it easier to visualize the proportions of each feed as you make your first entries.

Once the ration composition is complete, the user can recheck the animal data.

There are additional nutrient requirements other than those described in this program, among these are salt, vitamins. **If the user has no training in nutrition this programs use should be limited to checking to see if proven**

Table 2. Suggested Nutrient Levels

	Class 1 (10-25 lb)	Class 2 (26-40 lb)	Class 3 (41-125 lb)	Class 4 (126 lb & up)	Class 5[a] (Sows and Boars)
Metabolizable energy, kcal/lb.	1450	1450	1400	1400	1350
Calcium, %	.85	.75	.65	.60	.90
Phosphorous, %	.70	.65	.55	.50	.70
Crude protein, %[b]	19.50	17.50	15.30	13.50	13.50
Lysine, %	1.15	.95	.75	.62	.62
Tryptophan, %	.20	.18	.15	.12	.12
Threonine, %	.65	.60	.50	.40	.45
Methionine + Cystine, %	.60	.55	.50	.40	.40

[a]Based on a feeding level of 4-5 lb per day for bred sows and boars and full feeding for lactating females.
[b]The levels of protein will vary somewhat according to the grain and protein source used. It is critical that the rations be calculated to meet the amino acid requirements of swine e.g. lysine, tryptophan, threonine and methionine + cystine.

formulas are adequate for the class of swine being fed. A ration meeting the requirements calculated by this program may not be safe to feed.

Once the ration composition is complete, the user can scroll down to the "Feeding Sheet" to view the final ration. Ingredients are listed as percentages on "as fed" basis and as pounds for two batch sizes. The user can change batch sizes from the keyboard for the two batch columns to produce desired batches for mixing. If the program is running in the manual mode, the user must press "F9" each time a change is made in order to recalculate the new batches.

FEED NAME	PERCENT	BATCH SIZE 1000	BATCH SIZE 2000
CORN, YELLOW	77.95	779.5	1559
SOYBEAN MEAL 44	19.50	195	390
CALCIUM CARB	0.75	7.5	15
DICALCIUM PHOS	1.30	13	26
SALT	0.35	3.5	7
VITAMIN TM MIX	0.15	1.5	3
	100	1000	2000