

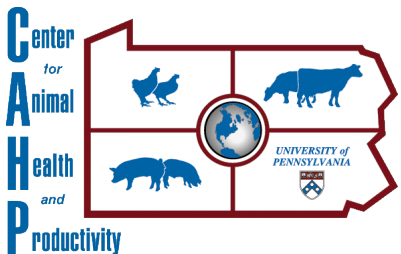
Formulating Rations Using the Upenn Ration Dairy Ration Analyzer

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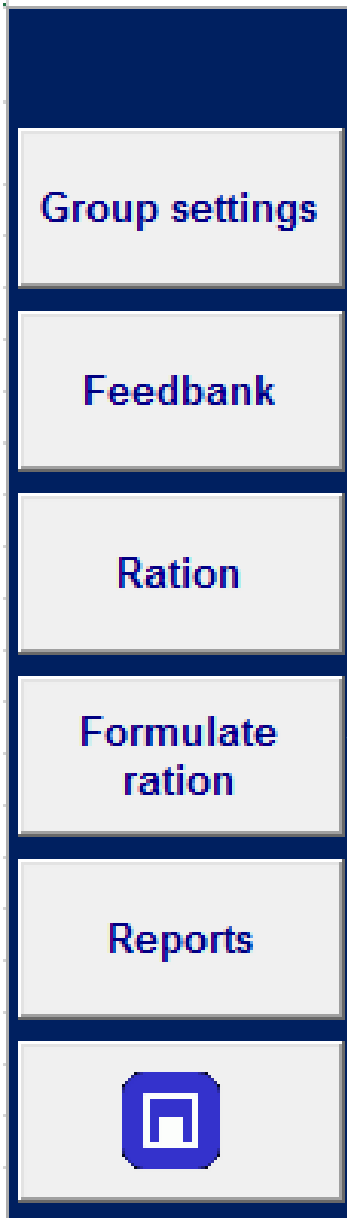


UPenn Dairy Ration Analyzer
University of Pennsylvania



Overview

- You have described the cow, environment and management for a group
- You have created a farm Feedbank with feeds from the Feed Library
- You have edited the composition of the feeds in the Feedbank based on laboratory analysis
- You have added feeds to the ration
- You want to formulate a ration



US customary ▾

Dry matter ▾

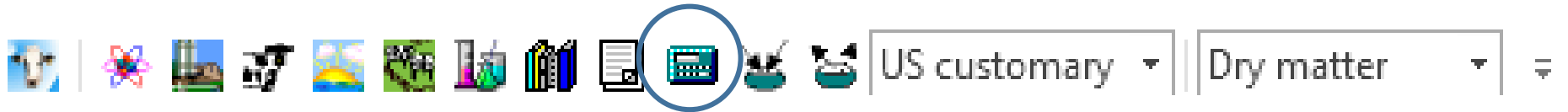


“Spot”
Always takes
you home

You can go to the home page, by clicking on “Spot” or you can click on the “calculator” button which will open the optimizer box from the ration page

Excel interface showing the optimizer table. The calculator icon in the ribbon is circled. The table below shows the input values for various feed ingredients.

	A	B	C	D	E	F	G	H	I
1	Feed	Input	Units	lbsAF (2)	lbsDM (4)	kgAF (1)	kgDM (3)	DM basis	Feed DM
2	0AlfHy20Cp37Ndf17LNdf	1.1025	lbs/DM	1.23	1.10	0.5556	0.5000	2.1%	90.0%
3	0CmSilPr35Dm41NdfCrse	16.1340	lbs/DM	46.10	16.13	20.9057	7.3170	30.9%	35.0%
4	0CornGrainGrndFine	9.7726	lbs/DM	11.11	9.77	5.0364	4.4320	18.7%	88.0%
5	0MolassesCane	0.5513	lbs/DM	0.76	0.55	0.3425	0.2500	1.1%	73.0%
6	0MinVit	1.1025	lbs/DM	1.16	1.10	0.5263	0.5000	2.1%	95.0%
7	0SoybeanHullsPellet	1.1025	lbs/DM	1.21	1.10	0.5495	0.5000	2.1%	91.0%
8	0SoybeanML47.5Solv	4.0859	lbs/DM	4.54	4.09	2.0589	1.8530	7.8%	90.0%
9	0BloodMeal	1.8235	lbs/DM	2.03	1.82	0.9189	0.8270	3.5%	90.0%
10	0RyeGsSil15Cp58Ndf8LNdf	14.6059	lbs/DM	41.73	14.61	18.9257	6.6240	28.0%	35.0%
11	0SaltNaCl	0.3308	lbs/DM	0.33	0.33	0.1508	0.1500	0.6%	99.5%
12	0SodiumBicarbonate	0.3308	lbs/DM	0.33	0.33	0.1508	0.1500	0.6%	99.5%
13	0MFP	0.1918	lbs/DM	0.19	0.19	0.0879	0.0870	0.4%	99.0%
14	0LimestoneGrnd	0.4410	lbs/DM	0.44	0.44	0.2010	0.2000	0.8%	99.5%
15	0MagOx	0.2205	lbs/DM	0.22	0.22	0.1005	0.1000	0.4%	99.5%
16	0VitaminPremixADE	0.2205	lbs/DM	0.22	0.22	0.1005	0.1000	0.4%	99.5%
17	0TraceMineralPremix	0.2205	lbs/DM	0.22	0.22	0.1005	0.1000	0.4%	99.5%



1	Feed	Input	Units	lbsAF (2)
2	0AlfHy20Cp37Ndf17LNdf	1.1025	lbs/DM	1.23
3	0CmSilPr35Dm41NdfCrse	16.1340	lbs/DM	46.10
4	0CornGrainGrndFine	9.7726	lbs/DM	11.11
5	0MolassesCane	0.5513	lbs/DM	0.76
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12	0SodiumBicarbonate	0.3308	lbs/DM	0.33
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15	0MagOx	0.2205	lbs/DM	0.22
16	0VitaminPremixADE	0.2205	lbs/DM	0.22
17	0TraceMineralPremix	0.2205	lbs/DM	0.22
18		0.0000	lbs/DM	0.00
19		0.0000	lbs/DM	0.00
20		0.0000	lbs/DM	0.00
21		0.0000	lbs/DM	0.00
22		0.0000	lbs/DM	0.00
23		0.0000	lbs/DM	0.00
24		0.0000	lbs/DM	0.00
25		0.0000	lbs/DM	0.00
26		0.0000	lbs/DM	0.00
27		0.0000	lbs/DM	0.00
28		0.0000	lbs/DM	0.00
29		0.0000	lbs/DM	0.00
30		0.0000	lbs/DM	0.00
31		0.0000	lbs/DM	0.00

Ration Formulation

NLS | Xtra

Feed constraints

Requirement constraints

Setup solver

Setup/Formulate

Derivatives

Forward

Central

Use Multistart

UPenn Method

Use automatic scaling

Round results

Constraint precision

.1 .0001

.01 .00001

.001 .000001

Reset solver Constraints Evaluation **Close**

Clicking the “Calculator button” from
The ration worksheet opens the
“Ration Formulation” box

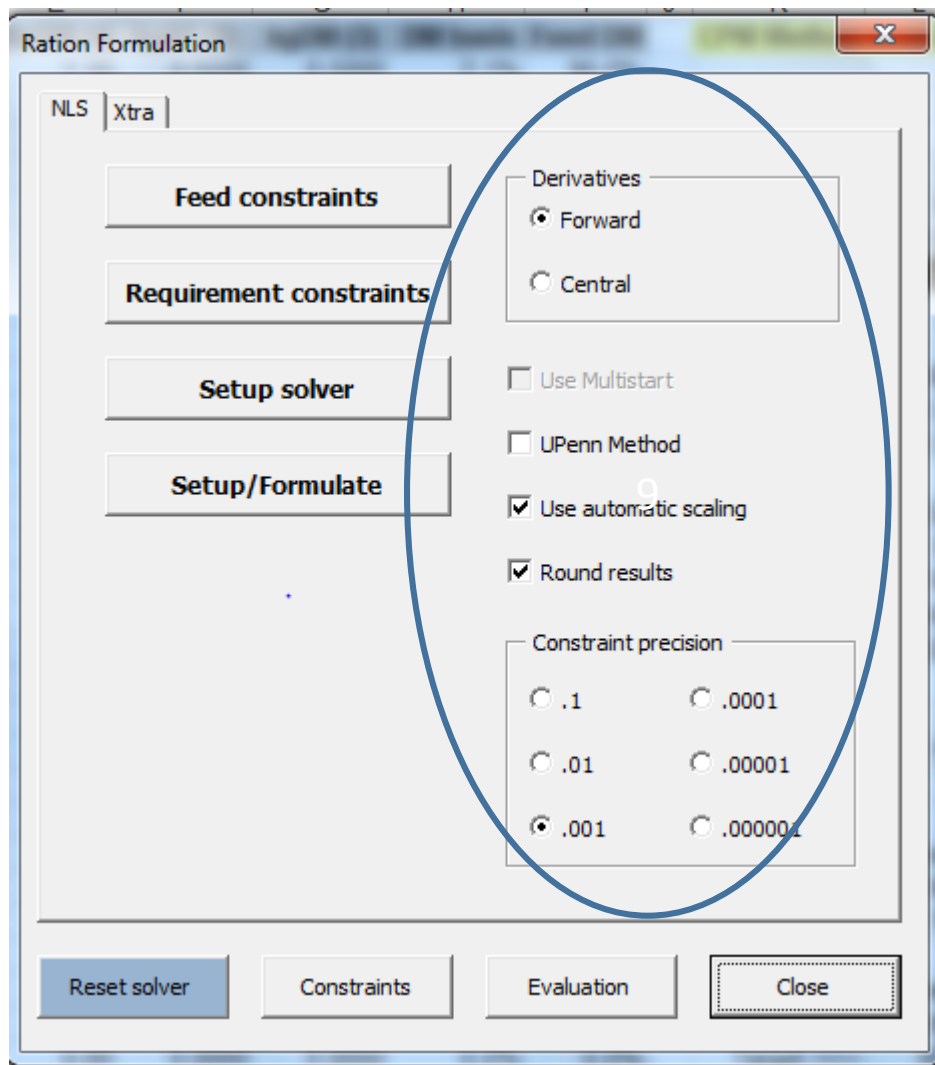
“NLS” tab

“Feed Constraints” button
opens table for min and max of feeds

“Requirement constraints” button
sets nutrient ranges

“Setup solver” button
if you want to change inputs
usually you don’t mess with this!!!

“Setup/Formulate” button
Runs the solver



What's all this stuff???

These set how the solver runs and with what precision

The Upenn Method essentially is the NRC and linearizes the problem by using DMI predicted for cow to fix passage rates and therefore MP and ME at that feed intake. It will not equal the Nonlinear solution, but allows a toggle with NRC and CPM

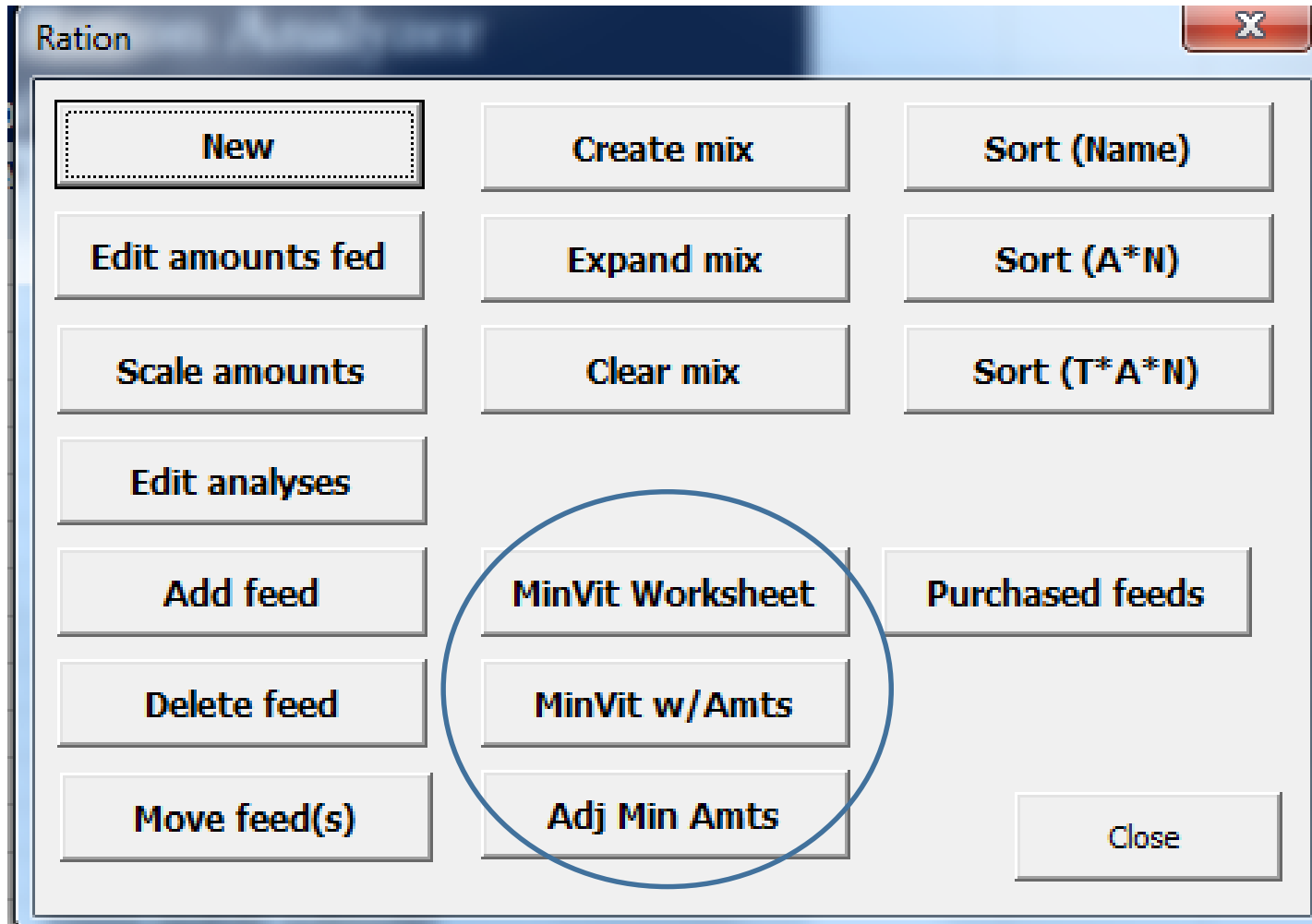
“Use automatic scaling” and “Round results” speeds up the solver

“Constraint Precision” use .001 or .0001 for fastest and most precise solutions. The .1 and .01 solve faster but are not the lowest cost

Evaluation takes you to the “CPMDairy” Evaluation Results Page

“Constraints” takes you to a report to evaluate feeds included and excluded from ration and nutrient ranges

Reset solver returns to default settings if you changed anything in the “Setup solver” feature, **WHICH MOST OF US SHOULD NOT DO!!!!**



When you are satisfied with the formulation results, you can balance your minerals

Proportion in the DM of the ration

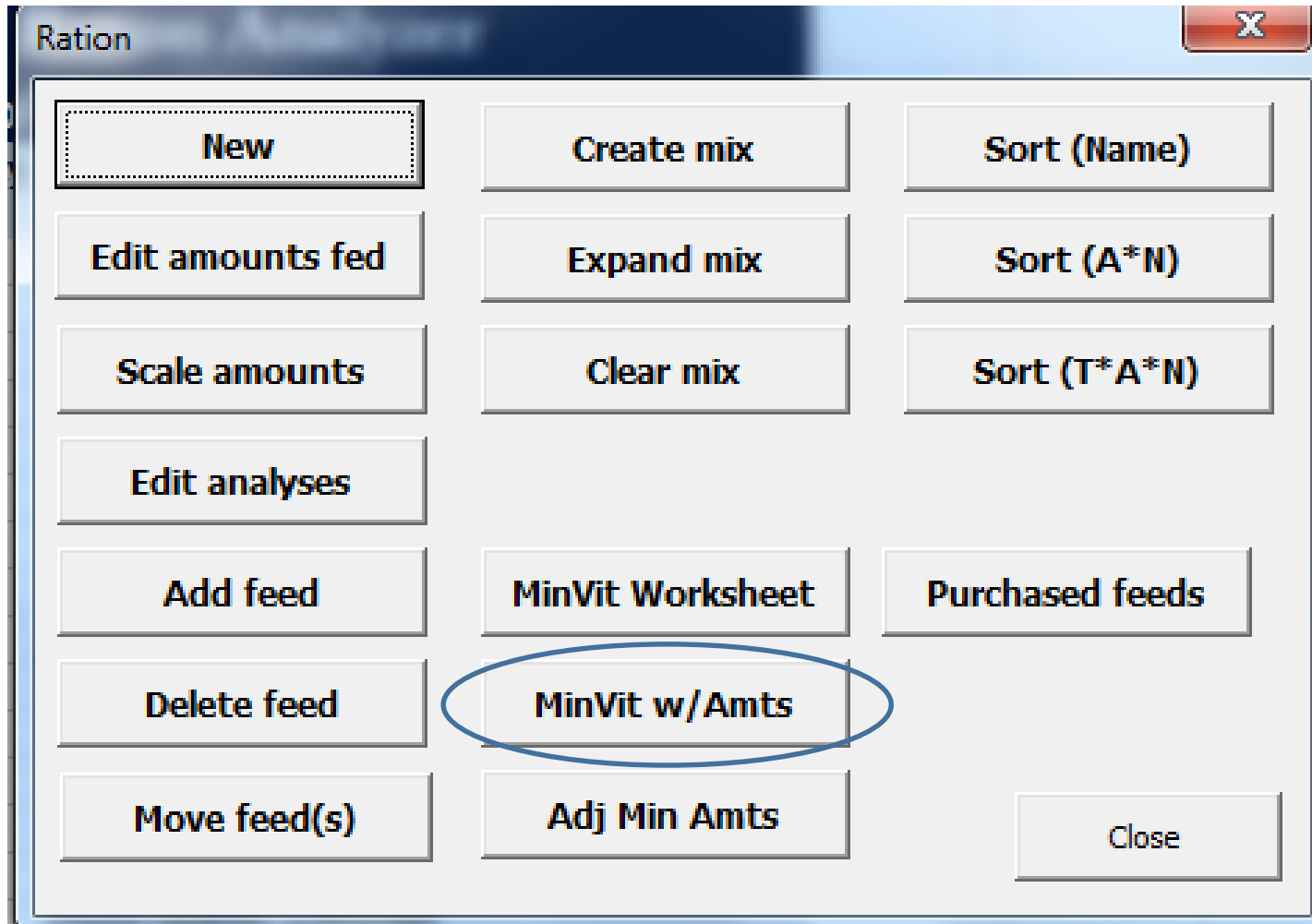
% DM of the mineral supplement

% of the mineral supplement

Mineral and Vitamin Worksheet													
Name	MinVit1			95.0	DM %								
%DM	0.0250	544.30	g dm	1.20	lbs dm	1.26	lbs AF						
Nutrient	User	NRC		Req	%Diet	Diet	Net		Factor	MinVit	pct	Net	Mix
Calcium	0.0000	0.62 %dm		134.99	0.54	116.73	18.26 g		1	18.26 g	3.3546	0.08%	3.35 %dm
Phosphorus	0.0000	0.35 %dm		76.20	0.33	71.77	4.44 g		1	4.44 g	0.8149	0.02%	0.81 %dm
Magnesium	0.0000	0.20 %dm		43.54	0.34	74.43	-30.89 g		1	0.00 g	0.0000	-0.14%	0.00 %dm
Potassium	0.0000	1.06 %dm		230.78	1.39	303.10	-72.31 g		1	0.00 g	0.0000	-0.33%	0.00 %dm
Sulfur	0.0000	0.20 %dm		43.54	0.21	45.60	-2.06 g		1	0.00 g	0.0000	-0.01%	0.00 %dm
Sodium	0.0000	0.23 %dm		50.08	0.37	80.96	-30.88 g		1	0.00 g	0.0000	-0.14%	0.00 %dm
Chlorine	0.0000	0.26 %dm		56.61	0.57	125.01	-68.40 g		1	0.00 g	0.0000	-0.31%	0.00 %dm
Iron	0.0000	17.00 mg/kg		370.12	276.09	6010.99	-5640.87 mg	0.001		0.00 g	0.0000	-259.09	0.0 mg/kg
Zinc	0.0000	50.00 mg/kg		1088.59	30.76	669.62	418.98 mg	0.001		0.42 g	0.0770	19.24	769.8 mg/kg
Copper	0.0000	11.00 mg/kg		239.49	13.84	301.24	-61.75 mg	0.001		0.00 g	0.0000	-2.84	0.0 mg/kg
Manganese	0.0000	14.00 mg/kg		304.81	50.31	1095.43	-790.62 mg	0.001		0.00 g	0.0000	-36.31	0.0 mg/kg
Selenium	0.0000	0.30 mg/kg		6.53	0.19	4.24	2.29 mg	0.001		0.00 g	0.0004	0.11	4.2 mg/kg
Cobalt	0.0000	0.11 mg/kg		2.39	0.48	10.41	-8.01 mg	0.001		0.00 g	0.0000	-0.37	0.0 mg/kg
Iodine	0.0000	0.50 mg/kg		10.89	0.43	9.27	1.62 mg	0.001		0.00 g	0.0003	0.07	3.0 mg/kg
VitA	0.0000	3.00 KIU/kg		65.32	0.50	10.88	54.43 KIU	3E-07		0.02 g	0.0030		100.0 KIU/kg
VitD	0.0000	0.76 KIU/kg		16.55	0.17	3.63	12.92 KIU	2.5E-08		0.00 g	0.0001		23.7 KIU/kg
VitE	0.0000	20.00 IU/kg		435.44	2.08	45.35	390.09 IU	0.0009		0.35 g	0.0645		716.5 IU/kg
DCAD1	0.0000				0.00	22.55	-22.55						
DCAD2	0.0000				0.00	26.37	-26.37						
Total										23.48 g			
Filler										520.81 g	95.6853		
											100.0000		
Vitamin A	1	retinol		0.300	mcg								
Vitamin D				0.025	mcg								
Vitamin E	1	DL-Alpha-tocopherol		0.900	mg								

If column "USER" Is 0 – then NRC Is used

You can add your Desired Ration Concentration as % or PPM, as Appropriate and The amount needed In the mineral mix will Be calculated

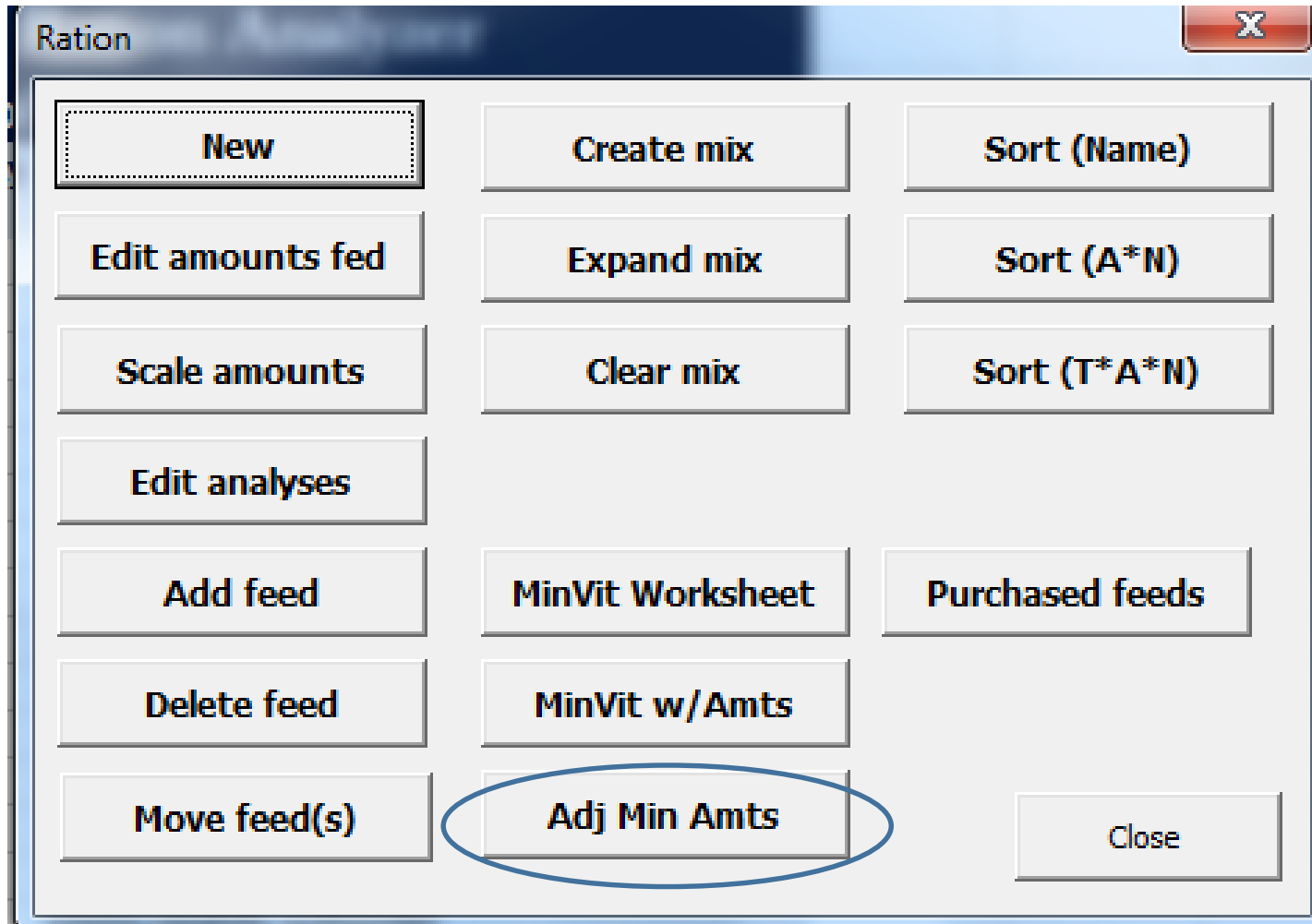


Clicking on MinVit w/Amts

Open the Mineral Vitamin Worksheet and
The amounts screen to view amounts as
Working with minerals
Vary minerals on the ration amounts and see
The balance in the diet

How much limestone do I need?

Change the amount on the Ration Amount
Worksheet and you can view the mineral
balance



"Adj Min Amt's" button

Replaces the selected feed with the mineral Supplement you created in MinVit Worksheet

You create the desired mineral mix to meet Your specifications for nutrient content

That MinVit becomes the mineral supplement You have in the diet

Note: this is based on nutrient content and not Individual supplements

To create a mineral supplement – use the MinVit w/Amts tab to adjust the amounts you Want in the ration to meet specifications and Then make a mix with the ingredients and This will create a mineral mix with the Ingredients you want.

Summary

- To Formulate: Set your feed constraints
 - Be sure your prices are correct
- Set your requirement constraints
- Make sure the “Use Automatic Scaler” and “Round Results” are on
- Set Precision to .001
- Click the “Setup/Formulate” button
 - Be sure a feed is set to a “big step” – i.e. all feeds 0 and CSG set to equal the DMI –
Need to begin from a ration amount that is close to predicted DMI
- Solver will take 20 to 40 seconds
- If no solution check feed and requirement constraints
 - “Constraints” button will help examine what feeds and nutrients are constraining the solution