LRNS SMALL DAIRY FARM TUTORIAL

The purpose of this tutorial is to learn how to use the LRNS to set up and evaluate simulations for a dairy farm. In this tutorial, we are going to use the actual data from a 40-cow dairy herd in central New York.

The LRNS was designed to work with multiple groups of dairy cattle on a dairy farm within a single file to allow for evaluations of rations, herd feed requirements, and herd nutrient excretion. All information about a farm is stored in one file. These files are called *Simulation Data Files*. They can be found on your hard drive in the LRNS folder and have the file extension *.ncps*. Simulation data files contain all the groups (and their inputs), all the feeds (and composition) used on the farm, and rations fed to each group.

The main feed library included with the LRNS is a read only file. Feeds that the user creates are stored in the User-Created Feed Library. Feeds used on the farm, while stored as part of the simulation data file, are part of the *Feeds Collection* and can be exported as a file for use in other simulations. A component of the feeds collection is mixes. Feeds that are included in mixes can be identified in the feeds collection by the M in parenthesis at the end of their name. When a mix is created, the percentage of each feed in the mix is calculated (for example 50% corn meal, 50% soy hulls). When the mix is fed to a group, the model decomposes the mix to run the calculations. For example, if 10 lb of the corn/soy mix is fed, the model performs the calculations based on 5 lb of corn meal and 5 lb of soy hulls.

There are three ways to move around in the program: the menus, the buttons on the tool-bar, and the tree (found on the left side of the screen). This tutorial will focus primarily on using the tree and the tool-bar as these are the fastest way to move around the program. As you work through this tutorial, experiment with different ways to move around and use the method that works best for you.

USE THE FOLLOWING STEPS TO GO THROUGH THIS TUTORIAL

Step	Description
1	*Create the simulation.* Click on the file menu, then click on New Simulation. You will be asked if you want to save your current simulation, click on No. You will then be asked to name the simulation. Name the simulation "Small Dairy Tutorial" and click on Save.
2	*Create the groups.* The model must always have data in it to function properly. When a simulation is created, it loads default data. After creating your simulation, you will be taken to the Simulation Parameters screen. On this screen you will create your groups, enter how many animals are in each group, how many days to feed the group, what units you wish to work in, whether to enter feed amounts in dry matter or as fed basis, and what level of solution you wish. Both levels calculate animal requirements the same. Level 2 uses the rumen sub-model where-as level 1 uses the Weiss system. Comments about the simulation can also be added. For this simulation, we will work with five animal groups. For this tutorial, we will be working in Metric Units, Dry Matter Basis, Level 2 solution, and Calories for the energy units. Do the following:

Step	Description		
	Group	**Click on**	**Enter the following**
	Lactating cows	Create Animal Group Create Group OK	Lactating Cow
	Name the group:	Lactating cows 35 animals 365 days to feed	
	Dry cows	Create Animal Group Create Group OK	Dry Cow
	Name the group:	Dry cows 3 animals 365 days to feed	
	Bred heifers	Create Animal Group Create Group OK	Replacement Heifer
	Name the group:	Bred heifers 12 animals 365 days to feed	
	Open heifers	Create Animal Group Create Group OK	Replacement Heifer
	Name the group:	Open heifers 19 animals 365 days to feed	
	Less than 6 mo. old	Create Animal Group Create Group OK	Replacement Heifer
	Name the group:	Less than 6 mo 10 animals 365 days to feed	

After you create all of your groups, click on the group named Default Animal Group. Now click on the Delete Selected Group button. When the program warns you that you are about to delete a group, click on Ok.

Step	Description

3   *Adding the feeds to the Feeds Collection.* Click on Feeds in the tree (or click on the Feeds button on the toolbar.). You will be taken to the Feeds Collection screen. This is the only place you can add feeds or rename a feed. For this simulation, we will be working with six feeds. To add them, click on the Add Feed(s) button. As you now see on your screen, feeds are listed by category. Select feeds by finding the feed you want and single clicking on it with your mouse. You will see that the feed moves to the bottom of the screen so you can view its composition. If you select a feed mistakenly, click on its name again. It will remove it from the list. Select the following feeds:

Category	Feed name
Grass Forages	Mixedsil 15Cp52Ndf12LNdf Medium Chop
Grass Forages	Orchardgrass – Hay, E. Bloom (106) Long
Legume Forages	Alfalfa Hay – L. Veg (202) Long Hay
Grain Type Forages	Corn Sil. 40% GR – Medium grnd (308)
Energy Concentrates	Corn HM – Grain56 (412) Finely Ground
Protein Concentrates	Soybean – Meal – 47.5 (525) Finely Ground

Click on the Add Feed button found on the lower left corner of the screen.

You are now returned to the Feeds Collection screen. The first feed listed in the feeds collection list is Corn Silage 45% Grain. This is the default feed that was loaded when the simulation was created. Click on it once and then click on the Remove Feed button.

Click on the Corn HM –Grain56 (412). Click on the up arrow next to the Feeds Collection List box. This will move the feed up. Move this feed to the very top. On the right of the screen is the Feed Components section. This is one way to change feed composition and it is the only place to change the feed name. Click on the Corn HM Grain – 56 (412) line under Feed Components. Now type High moisture corn. You have just renamed the feed.

Now move the Soybean – Meal –49 (525) up to be the second feed. Do not rename it.

Now move the Mixedsil 15Cp52Ndf12LNdf up to be the third feed. Rename it Hay silage.

Now move the Corn Sil. 40% GR – Medium grnd (308) up to be the fourth feed. Rename it Corn silage.

Now move the Alfalfa Hay – L. Veg (202) up to be the fifth feed. Rename it Dry hay.

The Orchardgrass – Hay, E. Bloom (106) should be the last feed. Rename it Round bales.

4   *Save the simulation.* Click on File, Save. At this point all of the groups are named and feeds are loaded. It is a recommended practice to save the file at this point.

5   *Edit the feed composition.* There are two ways to edit the feed composition. One way is to work with each feed individually on the Feeds Collection screen. If only one feed is going to be edited, this is the recommended procedure. To change the composition of more than one

feed, click on the Edit Inputs button on the tool bar. On the top of this screen you will find a listing of all of your groups in the simulation. Ignore this for now. On the bottom of this screen is the Feed Data section. You can change all of the feed composition here except for the feed name. To edit a feed composition, use the scroll bar at the bottom of the table to find the column you want to change, then click on the cell you wish to edit first (e.g. click on Cost). Enter the value and then either click on the next cell or use the arrow keys to move between cells. Be sure to watch your units! Most labs report ADICP and NDICP as percent of dry matter where the model uses percent of crude protein. A similar issue exists with lignin where labs report it as percent dry matter and the model uses lignin as a percent of NDF. Make sure you check the way your lab reports these values.

The following is the feed analysis for this farm (in model format):

	HMSC	Soy47.5	HCS	CS	Dry hay	Round bales
Cost $/ton	$80	$170	$35	$25	$140	$60
Homegrown	True	False	True	True	True	True
Dry matter	72	90	36	42	91	89
NDF	9.00	7.79	56.1	44.1	42.4	62.5
Lignin	2.22	2.50	10.85	7.75	17.00	8.50
CP	9.80	54.00	14.87	9.20	20.40	11.40
Fat	4.30	1.10	3.20	3.00	2.75	3.00
Ash	1.60	6.70	8.11	4.00	12.22	11.00
Sol-P	40	20	52	47	28	22
NDFIP	15.90	5.00	21.19	15.45	16.10	30.10
ADFIP	5.30	2.00	11.15	7.05	12.24	6.25
Ca	.03	.29	1.20	.27	1.35	.31
P	.31	.71	.42	.22	.60	.31

For all other analysis, use the feed library values.

Click on return. You will be back to the Feeds Collection screen.

6   *Save the simulation*

7   *Enter the description inputs for the group.* The first group we will work with is the lactating cows. To get to their inputs, either click on the Lactating cows branch in the tree or click on the Inputs button on the tool bar. The first tab we will work on is the Description Inputs. Enter the following inputs:

Animal Type: Lactating Cow (should already say this), press Tab
Age: 55 months (don't type in the word months), press Tab
Sex: Cow (should already say this), press Tab
Body Weight inputs: First click on SBW (shrunk body weight—for more details on body weight, see on-line help) now click on the box labeled Current. Enter 635 kg (bodyweight for this group), press Tab to go to the Mature input. Enter 635 kg, press Tab
Breed Type: Dairy (should already say this) press Tab

Step	Description

Days Pregnant: <u>70</u>, press Tab
Days Since Calving: <u>130</u>, press Tab
Lactation Number: <u>4</u>, press Tab
Calving Interval: <u>12.5</u>, press Tab
Exp. Calf Birth Weight: <u>43</u>, press Tab
Age At First Calving: <u>24</u>
Now click on the Production Tab

8   *Enter the production inputs for the group.* Production inputs describe the performance of the animal. Enter the following inputs:

Click on the input box Rolling Herd Average: <u>8,845</u>, press Tab
Milk Production: <u>29.8 kg</u>, press Tab
Milk Fat: <u>4.10</u> (enter as a whole number), press Tab
Now click on <u>True Protein</u> then click on the input box for milk protein and enter <u>3.30</u>, press Tab
Milk Price: <u>0.2646 $/L</u>, press Tab
Body Condition Score: <u>2.80</u> (on a Dairy Scale), press Tab
Breeding System: <u>Straightbred</u> (should already say this), press Tab
Breed: <u>Holstein</u> (should already say this)

Now click on the Management/Environment Tab

9   *Enter the management/environment inputs for the group.* These inputs describe the environment that the animals are housed in. Enter the following inputs:

Click on the Additive input: <u>None</u>, press Tab twice
Added Fat should not be checked. *This applies only to finishing cattle fed high-energy diets with ionophores.*
Wind Speed: <u>1.6 kph</u>, press Tab
Prev. Temperature: <u>15.6 C</u>
Prev. Rel. Humidity: <u>40</u>, press Tab
Temperature: <u>15.6 C</u>, press Tab
Relative Humidity: <u>40</u>, press Tab
Hours in Sunlight: <u>0</u>, press Tab
Storm Exposure: should not be checked, press Tab
Hair Depth: <u>0.64 cm</u>, press Tab
Mud Depth: <u>0</u>, press Tab
Hide: <u>Thin</u>, press Tab
Hair coat: <u>No Mud</u>, press Tab
Cattle panting: <u>None</u>, press Tab
Minimum Night Temperature: <u>10 C</u>, press Tab
Activity: click on the down arrow on the right side of the input box. Choose <u>Tie-Stall Barns</u>. For this simulation, all inputs under Activity will remain as the defaults. Click on the Ration Tab.

Step	Description

10   *Enter the ration for the group.* The first time you go to this screen, no results will appear on the right side of the screen. This is because the group is not fed and therefore the computations cannot be made. As soon as the feed amount for the first feed is entered, results will appear. Enter the following ration:

Click on the input cell for kg/day of the first feed. The amounts entered in this simulation are kg Dry Matter per day.

High moisture corn: 5.557 kg/day, press your down-arrow on your keyboard
Soybean – Meal –49: 2.778, press your down-arrow on your keyboard
Hay silage: 6.752, press your down-arrow on your keyboard
Corn silage: 3.818, press your down-arrow on your keyboard
Dry hay: 1.054, press your down-arrow on your keyboard
Round bales: 0, press your down-arrow on your keyboard.

The total should be 19.959 kg/day. The Total Intake box will still read 0. To update this box, click on the Management/Environment Tab, now click on the Ration Tab. The Total Intake box should now read 19.959 kg/day.

Summary results should look like this:
Entered Milk: 29.8 kg/day
ME allowable milk: 33.9
MP allowable milk: 30.5
MET allowable milk: 33.7
Days to gain 1 condition score: 268
Rumen N balance: 99 g/d
Peptide balance: 31 g/day
peNDF (pef) balance: 1.2 kg/day
Pred. DMI: 19.49 kg/day

To view a report for this group, click on the down arrow in the input box for Quick Report. Select the Diet Evaluation Report and then click on the view button. After viewing the report, click on the Return button to return to the Ration Tab.

11   *Save the simulation.*

12   *Evaluate and print reports.* You can print reports for each group as you evaluate the group or you can wait until all the groups are entered and then print all the reports for all the groups by clicking on the Reports button on the tool bar. Select the reports and groups you want to print and click on the Print button. Only groups that have rations entered can be printed.

13   Now enter the inputs for the Dry cows. Click on Dry Cows in the tree. You will be taken to the Ration tab for that group. Now click on the Description Tab.

14   The next table contains the inputs for the Dry cows, Bred heifers, Open heifers, and Less than 6 mo heifers groups:

Step	Description

	Dry Cows	*Bred heifers*	*Open heifers*	*Heifers < 6 mo*
Animal Type:	Dry Cow	Replacement Heifer	Replacement Heifer	Replacement Heifer
Age:	45	17	12	4
Sex:	Cow	Heifer	Heifer	Heifer
Current Body Weight:	635	454	340	181
Mature Weight:	635	635	635	635
Breed Type:	Dairy	Dairy	Dairy	Dairy
Days Pregnant:	276	160	0	0
Days Since Calving:	333	0 (can't change)	0 (can't change)	0 (can't change)
Lactation Number:	4.0	0 (can't change)	0 (can't change)	0 (can't change)
Calving Interval:	12.5	12.5	12.5	12.5
Exp. Calf Birth Weight:	43	43	43	43
Age At First Calving:	22	24	24	24
Rolling Herd Average:				
Milk Production:				
Milk Fat:				
True Protein:				
Milk Price:				
Body Condition Score:	3.00	3.00	3.00	3.00
Breeding System:	Straightbred	Straightbred	Straightbred	Straightbred
Breed:	Holstein	Holstein	Holstein	Holstein
Additive	None	None	None	None
Added fat in ration	No	No	No	No
Wind Speed:	1	1	1	1
Prev. Temperature:	15.6	15.6	15.6	15.6
Prev. Rel. Humidity:	40	40	40	40
Temperature:	15.6	15.6	15.6	15.6
Relative Humidity:	40	40	40	40
Hours in Sunlight:	0	0	0	0
Hair Depth:	0.64	0.64	0.64	0.64
Mud Depth:	0	0	0	0
Hide:	Thin	Thin	Thin	Thin
Min Night Temp:	10	10	10	10
Activity:	Dry Lots	Dry Lots	Dry Lots	Tie-Stall Barns
High moisture corn:	0	1.896	1.261	0.758
Soybean – Meal –49:	0	0.948	0.630	0.376
Hay silage:	0	2.304	1.533	0.921
Corn silage:	0	1.302	0.866	0.522
Dry hay:	0	0.358	0.240	1.960
Round bales:	10.151	3.175	3.175	0

Step	Description
15	*Save the simulation.*
16	*Evaluate and print reports.*