



The Milk Lines



February 2002

BIFS Forage Production and Dairy Manure Management Project

Before the Biologically Integrated Farming Systems (BIFS) project, participants used commercial fertilizer at an average rate per acre of 150 lbs N, 70 lbs P₂O₅, and 45 lbs K₂O to grow silage corn on manured fields. Once discovering manure water can supply the nutrients, they began to use little or no commercial fertilizer, a total savings of more than \$57/acre*! A typical dairy with enough manure nutrients to grow 300 acres of corn would save over \$17,000 each year. Investing a few thousand dollars on a flow meter and valve can be paid off quickly, plus the extra savings can offset additional management time needed (although Jeff Strom of Clauss Dairy says that it doesn't require more management time than an anhydrous tank).

*Value of fertilizer from UCCE cost studies: anhydrous ammonia = \$0.28/lb N, 6-20-20 = \$0.15/lb, muriate of potash = \$0.08

Monitoring Electrical Conductivity of Irrigation Water

Many producers who use manure water for irrigating and fertilizing crops have noted that heavy applications of manure water can reduce crop yield. One of the main reasons for this is salt application. Salt content in irrigation water can be measured indirectly by measuring the electrical conductivity (EC) in the water.

With low salt irrigation water, excess water leaches out of the soil root zone, taking salts with the water. However, if the irrigation water itself has too many salts in it, leaching won't help much. A handheld EC

meter can be purchased for less than \$50, and can help assess whether the salt content of the irrigation water is likely to cause yield reduction.

This table shows EC_e – the EC of the saturation extract from the soil (see your soil lab reports) and EC_w – the EC in irrigation water, above which yield reductions can be expected. Note that this is a seasonal average, and that crops will be more sensitive in different growth stages. The leaching requirement (LR) is the amount of water (% of applied) that must move below the root zone.

As you can see, corn is much more susceptible to high salt content than is wheat. For example, in order to have no salt-induced corn yield reduction, the EC of the irrigation water needs to be <1.1 dS/m, with a leaching requirement of 6%.

Crop	% yield reduction	EC (dS/m)	EC	LR (%)
Wheat	0	6.0	4.0	10
	10	7.4	4.9	12
	25	9.5	6.4	16
	50	13.0	8.7	22
Corn	0	1.7	1.1	6
	10	2.5	1.7	8
	25	3.8	2.5	12
	50	5.9	3.9	20
Alfalfa	0	2.0	1.3	4
	10	3.4	2.2	7
	25	5.4	3.6	12
	50	8.8	5.9	19

Adapted from Western Fertilizer Handbook, CPHA, 2002.

Ask the Expert – Alfalfa Can Use Manure Nutrients

*Carol Frate, Forage Crops Farm Advisor,
UCCE Tulare County*

Q – If I don't have enough corn/winter forage land area to utilize manure water nutrients, can I apply manure water to alfalfa?

A – Yes. One benefit is that alfalfa uses a lot of nitrogen. An 8-ton hay crop will remove about 400 lbs of N. As a legume, alfalfa usually produces its own nitrogen with the help of nitrogen-fixing rhizobia bacteria. However, if there is “easy” nitrogen in soil, alfalfa plants will use that nitrogen and shut down their own nitrogen production by as much as 80%. In addition, alfalfa has a taproot that can be 8 ft or deeper, so it can pull nitrogen (nitrate) from deeper in the soil profile than corn or winter cereals. An 8-ton alfalfa hay crop will also remove 95 lbs phosphorus (P_2O_5) and 346 lbs potassium (K_2O). However, with manure water application, you must take some precautions to avoid problems.

Q – What kind of problems are common?

A – There can be problems when manure water with high solids is applied to alfalfa, especially in summer. Don't use the sludgy water from the bottom of the pond on alfalfa is the first rule. Secondly, always dilute the pond water sufficiently with canal or well water to reduce the concentration of organic material, especially in summer. When soil temperatures are high, soil microbes digest the organic matter so quickly that they use up all the oxygen in the soil, essentially suffocating alfalfa roots and killing the plants. Dilution with fresh water also reduces the salt concentration, which, if too high, can reduce growth.

Q – How many salts can alfalfa take?

A – Salts are measured by EC (electrical conductivity) in units called decisiemens per meter (dS/m). At irrigation water EC's below 1.3 dS/m there is no effect on alfalfa. Once this threshold is exceeded, alfalfa yields can be reduced.

BIFS Dairy Producers Speak at Alfalfa/Forage Symposium

Two Dairy BIFS participants and the project mentor made up a panel discussing dairy lagoon water at the California Alfalfa and Forage Symposium in Modesto (Dec 13th). Gary Crowell, Loren Lopes, and Jeff Strom shared about their experiences with improved manure nutrient management. Each commented on how pleased he was with the flow meter and valve system, and how it had revolutionized his fertilizer program now that he could measure the manure nutrients applied to forage crops. Jeff reported a savings of \$60/acre, and Gary saved \$100/acre in fertilizer costs. Loren hadn't been using much fertilizer before-hand, but felt that by managing the manure water better, they are avoiding salt and other problems, and won't have to buy as many amendments to correct them. These conscientious producers who care about their impact on the land significantly improve the public image of dairy farming in California.

Calendar of Events

TBA, March 2002—Lunch meetings in north and south valley. These meetings have in the past been geared toward the BIFS participants, but we would like to open them to other interested dairy/forage producers. We will discuss recently collected data from the project and a specific topic related to manure management. For more information, contact Alison Eagle, phone: 559-646-6589, e-mail: ajeagle@uckac.edu.

The preceding information was taken from a newsletter edited by Alison Eagle, BIFS Dairy Manure and Forage Project Coordinator. Questions and comments may be directed to: Alison Eagle, Kearney Agricultural Center, 9240 S. Riverbend, Parlier, CA 93648. (559) 646-6589 (phone), ajeagle@uckac.edu (e-mail).

Dairy Herdsman Short Course

**Fresno State Univ. CATI Conference Room
April 22-24, 2002**

Contact Gerald Higginbotham at (559) 456-7558 for registration. Seating is limited. Apply ASAP.