

California Certified Crop Adviser
Performance Objectives for Specialty Certificate in Manure Management
November 19, 2009

I	Manure Properties and Production
1	For planning purposes, estimate the quantity of manure and manure nutrients (total N, P, and K) excreted annually by dairy cattle, beef cattle, poultry, and swine, and understand the main factors that affect this.
2	List materials, in addition to animal feces and urine, that may be present in manure collected in animal agricultural operations.
3	Compare relative amounts and forms of N in the following materials on dairy farms: corral manure, lagoon water, sludge, solids separated by mechanical screen, and aerobically composted solid manure
II	Manure Collection, Storage, and Treatment
4	Describe common methods used in California to collect and store animal excreta in milk cow dairies, beef feedlots, swine farms, and poultry farms.
5	Describe the importance of having secure and adequate storage capacity for manure.
6	Describe common physical and management safeguards used to assure illegal or reasonably avoidable seepage and surface discharge of stored manure does not occur.
7	Describe hazards and elements of worker safety in managing animal manure.
8	Be aware of available separator technologies and their effectiveness.
III	Manure Sampling and Analysis
9	Identify the chemical and physical properties that should be measured for liquid or solid manure that will be applied to crop land.
10	Describe methods for sample collection and sample storage for both liquid and solid manures.
IV	Crop Availability and Behavior of Manure-Derived Nutrients in Soil
11	Relate pattern of N mineralization and manure N availability to timing and method of application, type of manure, and crop N utilization.
12	Compare P availability of commercial inorganic fertilizers and animal manure.
13	Describe the potential for accumulation of salt and metals in manure-based cropping systems.

V	Nutrient Balance
14	Estimate whole herd manure nutrient production and other nutrient sources for a Animal Feeding Operation (AFO).
15	Estimate the N, P, and K budgets for crop fields receiving manure. Be capable of adapting the budget on a real-time basis as changes in actual conditions (i.e. rain, process water analyses, crop production, number of irrigations, etc.) alter the nutrient removal & delivery
16	Describe alternatives for achieving whole farm nutrient balance.
17	Be able to prepare a whole farm and preliminary field level nutrient management plan following the format used either by the Central Valley Waste Discharge Requirements General Order (Order No. R5-2007-0035) or the USDA-NRCS Manure Management Planning procedure.
VI	Manure Application
18	Estimate the quantity of N, P, and K removed by crops in the harvested biomass.
19	Describe the function and use of devices for lagoon water sampling, flow control, and flow measurement, as lagoon water (process wastewater) is pumped from storage to crop fields.
20	Describe in general the techniques used to ensure that lagoon water is mixed adequately with irrigation water prior to application to fields.
21	Differentiate between total and actual acreage available for application due to setbacks and buffers.
22	Describe procedures for measurement and calibration of solid and slurry manure application.
23	Using laboratory analyses or published values for manure nutrient content, calculate the weight or volume of manure required to achieve a desired nutrient application rate.
24	Understand how to manage irrigation systems in order to control the rate and distribution uniformity of liquid manure.
VII	Regulations and Cost-Share programs
25	Know what the EPA CAFO Rule is and list main elements of CAFO requirements.
26	Know which state regulations in CA govern livestock manure and which state agencies administer regulations. Know basic requirements of the regulations.
27	Know which organizations can provide technical assistance on animal waste management.
28	Know the purpose USDA NRCS Comprehensive Nutrient Management Plan.
VIII	Potential Animal Manure Impacts on Water Quality, Air Quality, and Animal Production

29	Describe how manure N:P and N:K ratios and N mis-applications create the potential for environmental, animal health, and agronomic problems.
30	List manure biological and chemical constituents that can degrade surface and ground water quality, their forms, and the way in which they impair water quality.
31	Describe the pathways to groundwater and surface waters that can be taken by biological and chemical constituents of manure.
32	Describe State of California system for classifying surface water impairment and know where to find the list of impaired waters.
33	Describe potential impacts of manure management on air quality and list manure constituents that are potential air pollutants.
34	Describe briefly common methods used to limit air quality impacts of manure management.