

When is Manure the Right Solution for Cropping Systems?

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Find us at: manure.unl.edu

Animal Manure Management Team Objectives



Build awareness about the value of manure.



Demonstrate benefits of manure via on-farm research and demonstrations.



Increase confidence among crop farmers in identifying fields likely to derive the greatest value from manure.

Our Shared Goal...



Deciding whether or not manure is the **right solution** for your business is based on your individual needs.

Nutrient Management

A complete fertility program that incorporates all available nutrients, including manure

Integrated Pest Management

Innovative pest control and preemptive strategies that help maximize yield while protecting the environment

Water and Soil Management

Maintaining the balance between water conservation and optimal production by understanding the relationship between soil and water properties

Crop Management

Production of healthy, cost efficient and environmentally sound crops and livestock

Manure's Role in Nutrient Management

A complete fertility program that incorporates all available nutrients, including manure

Research shows that when equivalent rates of nutrients are applied as manure or commercial fertilizers, nutrient losses from manure applications are similar or below those associated with chemical fertilizers.

P

N

K

Manure's Role in Nutrient Management

A complete fertility program that incorporates all available nutrients, including manure

Adding mulch, cover crops and/or compost increases soil organic matter, populations of beneficial soil microbes and amounts of active soil carbon and nitrogen available to plants.

P

N

K

Manure's Role in Pest Management

Innovative pest control and preemptive strategies that help maximize yield while protecting the environment

Good soil management can improve water storage, drainage, nutrient availability and root development, all of which may, in turn, influence crop-defense mechanisms and populations of potential beneficials and pests.



Altieri et al. 2005.

Measuring & Demonstrating Soil Biological Properties





Arthropod Evaluation

Soil cores from 0-20 cm

Burlese Funnel extraction for one week

Specimens classified and quantified

Ecomorphological Index (EMI) assigned

QBS Score calculated

Acari (mites)



Contribute directly or indirectly to soil processes like nutrient cycling, soil formation, and pest control

Identified in all samples, but significantly greater mean abundance in SSW

Collembola



Impact soil macroaggregation
Higher acari:collembola = better soil quality and habitat stability

Greatest ratio of acari:collembola observed in SSW

Symphyla



Feed on plant roots; can be a major pest if population not controlled by other organisms

Lowest mean abundance in SSW < SS < CON

Manure's Role in Pest Management

Innovative pest control and preemptive strategies that help maximize yield while protecting the environment

A combination of manure and woodchips seems to positively impact soil biology by supporting proliferation of "good" soil organisms that outcompete "bad" soil organisms.

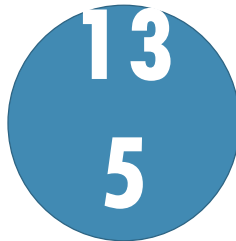


Altieri et al. 2005.

Manure's Role in Pest Management

Fertilizer practices can influence plant defenses.

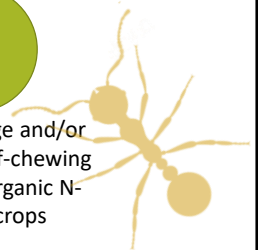
A review of **50** years of research identified:



> plant damage and/or number of leaf-chewing insects in inorganic N-fertilized crops



< plant damage and/or number of leaf-chewing insects in inorganic N-fertilized crops



Manure's Role in Water and Soil Management

Maintaining the balance between water conservation and optimal production by understanding the relationship between soil and water properties

“As a rule, ecosystems with more diversity tend to be more stable: they exhibit greater resistance — the ability to avoid or withstand disturbance — and greater resilience — the ability to recover from stress.”

Manure's Role in Water and Soil Management

Greater soil aggregate stability resulting from soil biological activity that is fueled by organic amendments can reduce runoff and erosion (e.g. non-point source pollution).

Organic N in manure is less prone to leaching than inorganic N in fertilizer.

Manure's Role in Crop Management

Production of healthy, cost efficient and environmentally sound crops and livestock

There are excellent opportunities to make money with manure as fertilizer by closely linking livestock production facilities with nearby row crop production ground.

In a Missouri assessment, a 4800-hd grow finish hog operation using modern diets could meet the fertilizer needs of two sections of land in a corn-soybean rotation with manure while increasing net income at least \$25,000 with a return on assets greater than 15%.

Manure's Role in Crop Management

NEBRASKA MANURE SETBACKS

LARGE Permitted Animal Feeding Operations
Manure application and stockpiles must be at least 100 ft. from any surface water, wells, open tile lines, etc. OR a 35-ft. wide vegetative buffer can be used.

SMALL & MEDIUM Animal Feeding Operations
Manure application and stockpiles must be at least 30 ft. from any surface water, wells, open tile lines, etc.

100 FT.
35 FT.
30 FT.

All animal feeding operations must maintain a 1000-ft setback from municipal wells.

MIND YOUR "MANURE MANNERS"

MANURE DO'S & DON'TS

MANAGE AS A NUTRIENT Only apply as much nutrients as crops need to maximize nutrient's value.	DON'T OVER APPLY Nutrients are a valuable thing to waste. Apply only what a crop needs and avoid your dollar by fertilizing more acres.
TARGET SOIL NUTRIENT P & N Manure's value is greatest when applied to fields needing more than just nitrogen.	DON'T APPLY BEFORE RAIN Nutrient runoff risk increases significantly within 24 hours of manure application.
MAKE MANURE #1 Properly handle manure resources before applying. Facilities to maximize nutrient substances that can lead to environmental losses of nutrients.	DON'T IGNORE NEIGHBORS "Neighbors" often is the critical link for manure. Manage manure to maximize value, because and respect those neighbors nearby that manage.
CONSERVE NITROGEN Apply to incorporate manure within 24 hours, when feasible, to minimize nitrogen losses. Last nitrogen to last value.	DON'T STARVE YOUR SOIL Covering soil minimizes nitrogen loss and a soil fertility boost. Manure "feeds" soil with organic matter and "helps" that break down to deliver nutrients to plants.
PROTECT WATER Use grass buffers along waterways. Contains runoff from production areas and manure stockpiles. Keep manure away from the water, drinking water wells, surface water, etc.	DON'T GET TOO CLOSE Whether your manure management is guided by an regulatory permit or not, you are responsible for protecting water quality. Know and follow setbacks.

MANURE HAPPENS, TAKE CREDIT.

Make the Most of Manure
A reference for landowners receiving livestock manure

- Be a good neighbor!** Stockpile manure considering distance to at least 100' from wells or surface water.
- Spread manure in a timely fashion.** Use stockpiled manure as soon as possible. Nutrients (and manure value) will be lost over time.
- Protect water quality.** Do not apply manure within 30 ft. of surface water. Permanent vegetative buffers between the field and surface water is ideal.
- Maximize manure's value.** Get a nutrient analysis and match application to crop needs.

MANURE HAPPENS, TAKE CREDIT.
UNL Animal Manure Management Team
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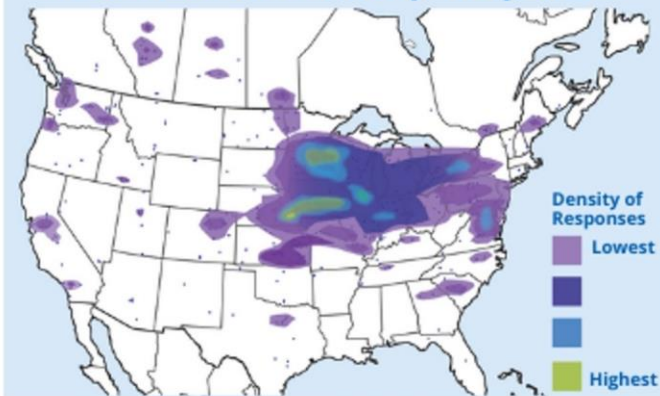
UNL Animal Manure Management Team, 2021
NeGuide 1235
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What do audiences understand and value as **benefits of and **barriers to** manure use?**

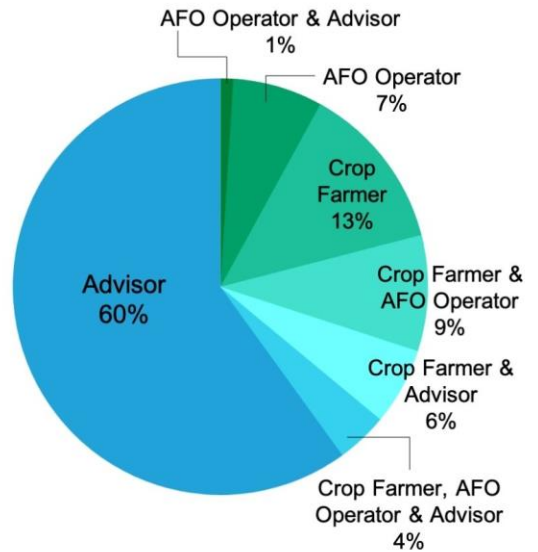


RESPONDENT DEMOGRAPHICS

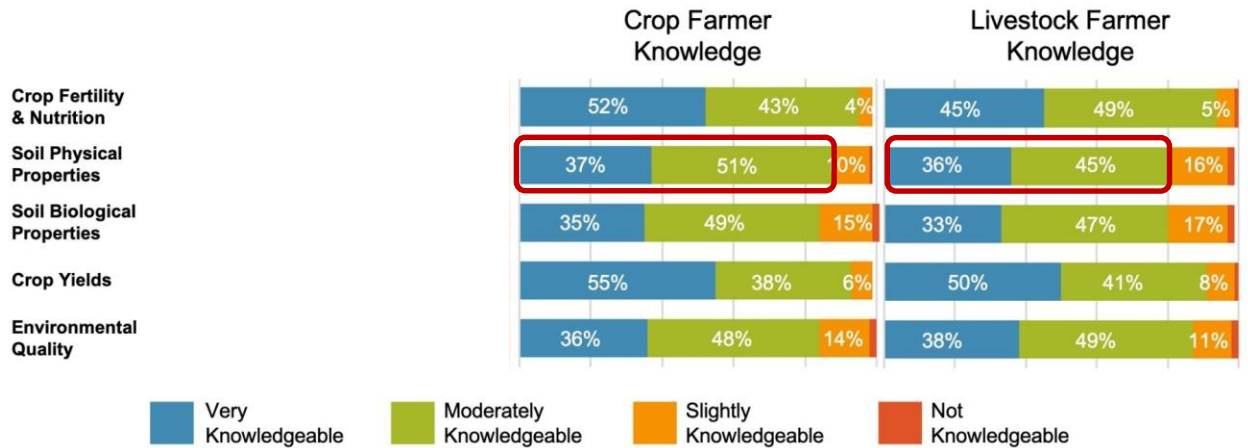
Distribution of Survey Responses



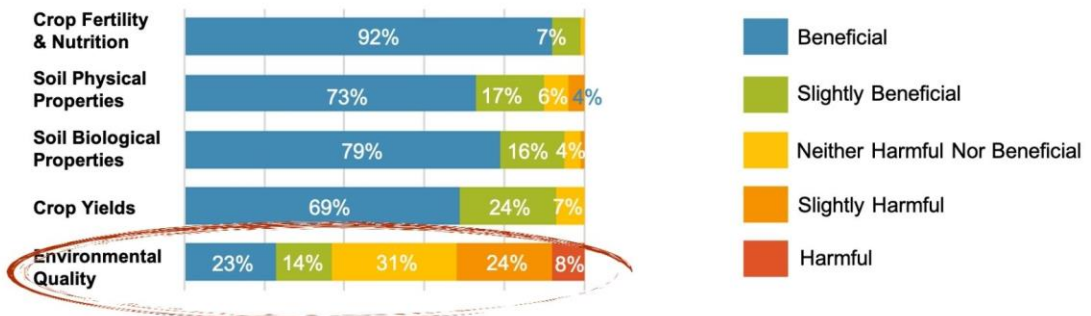
957 Responses



WHO'S IN THE KNOW?



MANURE: HARMFUL OR HELPFUL?

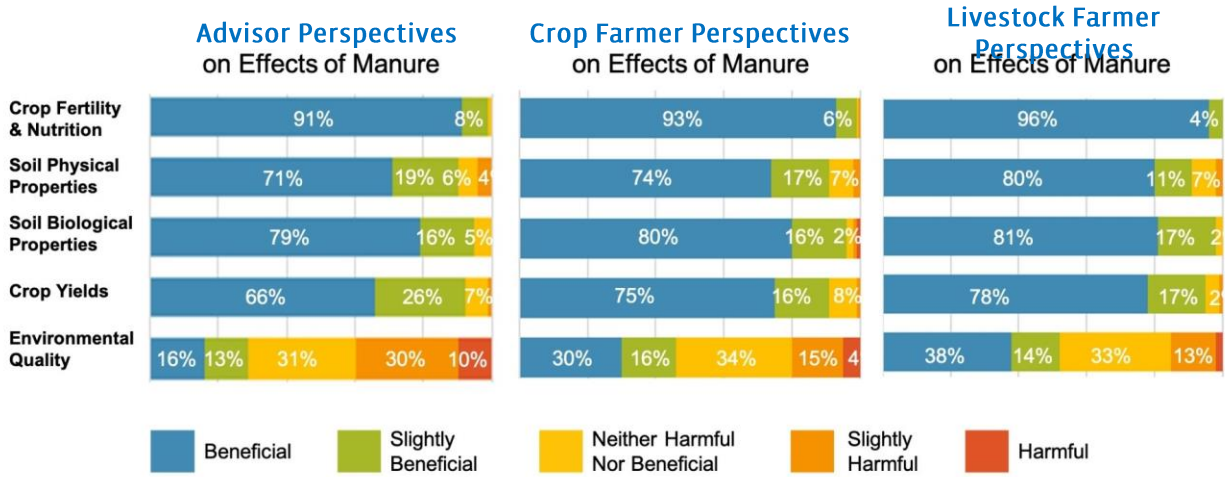


Among farmers and/or advisors, **99%** believe manure is at least slightly beneficial to crops.

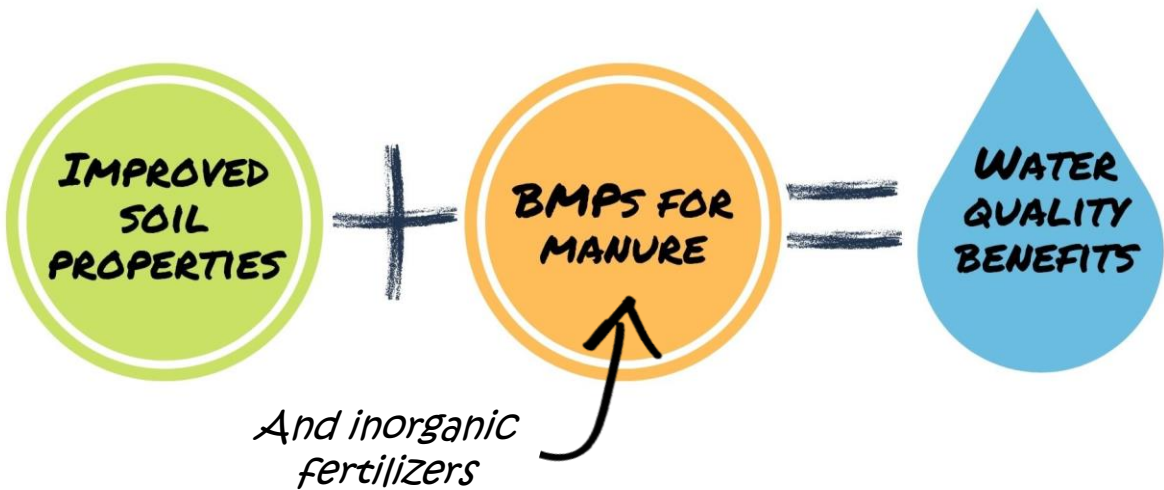
The majority also believe manure benefits "soil health" characteristics and crop yields.

Opinions about manure impacts on environmental quality were varied.

MANURE: HARMFUL OR HELPFUL?



Bridging the Gap



CAN MANURE & FERTILIZER WORK TOGETHER?



- Complement each other **70%**
- Rarely compete or complement each other **12%**
- Compete – fertilizer is preferred **9%**
- Compete – manure is preferred **8%**

Among farmers and advisors who regularly use or recommend fertilizer, **the majority believe manure and fertilizer complement each other.**

TOP 10 CHALLENGES TO MANURE USE IN CROP SYSTEMS

- 1 Transportation & application costs
- 2 Odors
- 3 Timeliness of application
- 4 Field conditions limiting application
- 5 Time/labor requirements
- 6 Equipment compaction
- 7 Poor application uniformity
- 8 Regulation of manure
- 9 Weed seeds introduced by manure
- 10 Initial costs for adding manure



Key Messages

Manure positively impacts soil resistance — the ability to avoid or withstand disturbance — and resilience — the ability to recover from stress.

When used according to best management practices, manure reduces risks of erosion and runoff of contaminants to surface water.

The body of research supports the assertion that organic fertilizers reduce pest risks more than inorganic fertilizers.

Manure Happens.

The UNL Animal Manure Management Team wants to help farmers make the most of it.



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