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Food Safety Considerations for Integrating Livestock into Produce Cropping Systems

Photo: Devon Regan, Montana State University

Integrating livestock with vegetable crop production takes advantage of livestock's natural place in agro-ecosystems: cash and cover crop residues are consumed, nutrients are cycled, weeds are suppressed, and soil health is increased. However, in order to protect the safety of the food consumer, it's important to adhere to certain standards.

Farmers who are integrating livestock grazing in a produce cropping system should treat the area in accordance with food safety guidelines as having had a raw manure amendment application. Raw manure contains pathogens that can cause illness in humans when ingested on fresh produce (Bihn et al., 2014). The following offers some general guidelines and recommendations to reduce the likelihood of microbial contamination on produce when manure is present.

The Produce Safety Rule under the Food Safety Modernization Act (FSMA) has established national standards for food-safety practices on produce farms, including practices regarding the use of manure. The U.S. Food and Drug Administration (FDA) is the agency charged with regulating and enforcing the Produce Safety Rule on qualified farms. Although many small produce operations are exempt from the requirements of the Produce Safety Rule, the rule establishes best practices for on-farm food safety that all farms should follow. Even if a farm is exempt from the requirements of FSMA, it is still responsible for the quality and safety of its produce and liable for damages if microbial contamination on produce causes a foodborne illness.

The FDA is currently conducting research to establish evidence-based requirements for manure application on produce farms. Until the FDA establishes different standards, it is utilizing the USDA National Organic Program standards for raw manure, which are as follows:

- 90-day interval between raw manure application/presence and harvest of crops that ***do not*** touch the soil (e.g., tomatoes, peppers).
- 120-day interval between raw manure application/presence and harvest of crops that ***do*** touch the soil (e.g., leafy greens, cabbage, carrots, etc.).
- The Produce Safety Rule requires that untreated biological soil amendments of animal origin, such as raw manure, must be applied in a manner that does not contact covered produce during application and minimizes the potential for contact with covered produce after application.

For northern latitudes, this essentially means that there should be an area set aside on your farm for a full season to incorporate animals grazing on cover crops. If there is enough room, this can be part of your rotation schematic.

Additionally, the Produce Safety Alliance recommends that animals not be present or adjacent to the cropping area during the growing season. Grazing animals in or next to a produce field introduces the risk of produce being contaminated by animal manure through wind drift on a dry day or runoff following a rain (Produce Safety Alliance, 2017).

Case Study: Integrating Livestock into Market Garden Production

Eric and Jill Skokan raise vegetables, sheep, pigs, chickens, turkeys, and geese on their Certified Organic and Certified Biodynamic farm outside Boulder, Colorado. The 130-acre Black Cat Farm markets this array of wholesome food through two restaurants that they operate in Boulder, a CSA, and the Boulder Farmers Market. Food safety is of utmost concern to the Skokans. Incorporating the 120-day rule into all of their cropping rotations is standard practice for Black Cat Farm.

Equally important to the Skokans, from a soil-health standpoint, is the year-round presence of a living root in the soil. For this reason, cover crops are planted and later grazed by sheep and pigs in a regular rotation with their cash crops. Cover crops are always grazed in the flower to prevent unwanted seed set. The Skokans like to switch cash and cover crops from winter to summer annuals and also rotate between the four crop types.

Radish and buckwheat are a go-to cover crop mix to fill in short periods between cash crops because of their ease of establishment, fast growth, weed suppression, and grazing palatability. A limitation of using radish is that it shares pests common to other brassica cash crops.

When pressed for time to plant, graze a cover crop, and wait 120 days before harvesting another cash crop, the Skokans will often seed the cover crop during the last cultivation of the first cash crop, usually three weeks before the crop is harvested. An example is a broccoli cash crop-seeded in mid-April. It will be harvested in mid-June to early July, with a cover crop of peas, daikon radish, oats, and buckwheat over seeded during the last cultivation. The residual broccoli stalks are grazed, along with the flowering cover crop, in early to mid-August. This then allows a second cash crop of spinach to be seeded in time to make it through the winter and be harvested in early spring of the following year. A full-season cover crop or a second cash crop can then follow.

The Skokans use winter wheat, spelt, barley, and oats as winter cover crop species, with the oats and barley winter-killing. They also plant full-season cover crops that are rotated through their cropping system.

Although they use livestock to harvest the cover crops, tillage precedes the planting of a cash crop. They are considering experimenting with no-till, but there are concerns that sheep may not fully terminate the cover crop. The hogs are a different story. They will terminate all cover crops and also any weed on the place, including perennial giants such as Canada thistle and teasel.

The stocking densities for the Tunis and Karakul sheep and Mulefoot and Hereford pigs are often 30 to 40 head per acre. This allows for speedy grazing of the cover crop. The Skokans graze the covers and cash-crop residual to two inches with the sheep and often allow the pigs to graze and root further, depending on their cropping goals. Preceding a cash crop that demands high fertility, such as spring-planted broccoli, the hogs may be fed on the late-fall-grazed plot for an extra 30 days. This would still allow at least 120 days between the cover crop grazing and the broccoli harvest. Finished lambs and hogs are harvested and provide Chef Skokan with an excellent meat product, as well as serving to close the crop-livestock loop on the farm.

Integration of livestock with vegetable crops at Black Cat Farm enhances the farm's soil health and provides an additional product that is utilized in the farm's eating establishments. Applying FSMA's 120-day rule to all crops provides confidence in the safety of Black Cat Farm's produce. The strategic use of livestock by the Skokans is an excellent example of stacking enterprises to exponentially increase the overall profitability of their farm.

References

Bihn, Elizabeth A., Michele A. Schermann, Annette L. Wszelaki, Gretchen L. Wall, and Susannah K. Amundson, 2014. Soil Amendments Decision Tree. National Good Agricultural Practices Program, Cornell University. https://gaps.cornell.edu/educational-materials/decision-trees/soil-amendments

Produce Safety Alliance. 2017. Produce Safety Alliance Grower Training Course. Version 1.1.Module 3: Soil Amendments. Cornell University. https://producesafetyalliance.cornell.edu/sites/producesafetyalliance.cornell.edu/files/shared/documents/Tab-4-Soil-Ammendments-V1.1.pdf

Further Resources

- Related ATTRA Resources
  - ATTRA Food Safety videos, https://attra.ncat.org/multimedia/videos/#Food%20Safety
  - ATTRA Food Safety page, https://attra.ncat.org/food_safety
- FDA Brief on Food Safety Modernization Act Requirements, www.fda.gov/media/94738/download
- Produce Safety Alliance, https://producesafetyalliance.cornell.edu/food-safety-modernization-act/produce-safety-rule
- Family Farmed On-Farm Food Safety Project, https://onfarmfoodsafety.org

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