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# Cornell Cooperative Extension

## Central New York Dairy, Livestock and Field Crops

*Quarterly Newsletter*

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# Wintering Pregnant Beef Cattle

*By Ashley McFarland, Regional Livestock Specialist*

Here in the northeast we face some harsh winter weather conditions. One day it may be 40 degrees and sunny and the next negative 7 and blistering cold, not including the wind-chill. So, many producers often wonder how the temperature fluctuation affects their beef cattle.

Beef Cattle are very hardy animals if given the proper nutrition and a source of wind break. They can withstand some tough weather conditions that winter throws our way. However, a thin cow will not fend as well, nor will an over conditioned animal.

Here are a few suggestions to minimize cold weather stress on cattle:

The first suggestion I give to producers is to complete a body condition score on your entire herd prior to winter. Sometime in August/September, go through your herd and cull cattle that are below a 3 BCS or separate them to allow for an increase in feed intake. The number one way to reduce cold stress in cattle is to improve their body condition score. Our body condition scoring system goes from a range of 1 – emaciated to 9 – extremely fat. The ideal body condition score of a 5–7 will allow cattle to conserve body heat. Also, cows in an ideal body condition score of 5-7 typically have a balanced ration which will assist in minimum stress in the winter months.

The second suggestion is nutrition. I always cringe when I hear producers say “I will make junk hay for my beef cattle. First cutting hay made in July will be good enough for them. They don’t require good feed”. Well guess what folks.... That is not true! Would we feed a pregnant woman “junk” feed and expect her to have a healthy baby? Not at all. So let’s take care of our momma cows and feed them what they require. Typically, a pregnant cow in good condition will require a 20% increase in feed intake to maintain her basic requirements and to keep up with the fetal growth requirements. If we do not increase her requirements we will see a few things happen: decrease in weight, low milk supply, calving issues, more likely to get sick and a weak calf at delivery. So remember, it’s very important to keep our cows on a well-balanced ration, whether that be an all forage diet with free choice minerals or a grain and hay ration with free choice minerals. The choice is yours.

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## *Wintering continued*

The third suggestion is wind break. Most beef cattle producers do not have adequate barn space for their herds. That being said 75% of our pregnant cattle are outside all year long, which is perfectly okay. Access to the outdoors tends to be healthier and minimize exposure to illness. However, we need to give them some sort of wind break to help minimize the wind chill. A few options are setting extra bales two bales high in a row to allow them to stand by an outdoor three-sided shed, a thick tree area, access to the side of a building or access to get into a building if they desire to. Studies have shown that cattle without a windbreak will drop in body condition score trying to maintain heat. This will also increase your feed intake and cost you more money.

The final suggestion is continuing to monitor the environment your cattle are in. Is the area you have sacrificed for a winter area muddy and wet? If so, rolling out bales of straw or mulch hay could be an option to allow the animals a clean place to lay. This would have to be done often and in a different area every week to ensure there is a semi-clean area to bed down. Another option is rolling out your bales of feed and allowing them access to bed on it as well as eat it. There are many options for bedding outdoors, and the cleaner the cows stay the more body heat they are able to store.

As winter is upon us in our region these are just a few tips to help reduce feed costs and maintain healthy, happy cattle.



# Creep Feeding Primer

by Susan Schoenian, Sheep & Goat Specialist, University of Maryland Extension

Creep feeding is a means of providing supplemental nutrition to nursing lambs and kids. It is accomplished by giving lambs and kid's access to extra feed or better pasture, while excluding their dams.

Lambs and kids that are born in the winter months are often creep fed, since pasture is usually not readily available. Show animals are typically creep fed, in order to get them bigger for show.

Creep feeding is recommended for accelerated lambing and kidding programs, in flocks and herds where there are a lot of multiple births, and anytime milk production is a limiting factor. Artificially-reared lambs and kids should be creep fed to facilitate early weaning. Creep feeding is also advisable when pasture quality or quantity is lacking.

Lambs and kids that are creep-fed will almost always grow faster than those that are not, especially if grain is the source of supplemental nutrition. Faster growth means lambs and kids can be marketed younger and sooner, often in time for high demand periods (e.g. Orthodox Easter).

Creep feeding teaches young animals to eat. It reduces the stress of early weaning. The rumens of creep-fed lambs and kids will develop faster. I've seen three week old lambs chewing their cuds. It is always more economical to feed lambs and kids than does and ewes. A young lamb or kid converts feed to gain very efficiently. The extra nutrition (especially protein) may help to improve tolerance to internal parasites.

Creep feeding does not need to be complicated. A "creep area" may be set up in the barn or out on pasture. The creep barrier needs to be big enough for lambs to fit through, but small enough to keep even the smallest ewe out. A tire can be used as a creep barrier. Some gates have big enough openings that kid goats can slip through. The creep area should be clean and well-bedded, an area where the lambs and kids will like to go.

Creep feed may be fed in troughs or self-feeders. Good creep feeders don't allow lambs or kids to play on (or in) or put their feet in the feeders. Creep rations don't need to be complicated -- just fresh, palatable, always available, and highly digestible. Typical feed ingredients are ground or cracked corn, alfalfa hay or meal, soybean meal, oats, and molasses. The percent protein in the creep ration should be at least 14 to 18. The protein should be all-natural (no urea).

It is recommended that lambs and kids be introduced to creep feed early in life, ideally by the time they are 10 days old. You can make your own creep ration or purchase a commercial product. On my farm, I start with a mixture of soybean meal, cracked corn, and minerals. Some producers use straight soybean meal for their creep starter or top-dress their creep ration with it. Soybean meal is very palatable to young lambs and kids. As my lambs get older and begin chewing their cuds, I gradually switch their creep ration to whole barley and a pelleted protein supplement.

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## *Creep Feeder continued*

When lambs are young, feeds with a small particle size are more palatable to them. As they get older, they prefer coarser feeds and are able to digest whole grains very efficiently. The protein content of the ration can be reduced as the lambs get older.

For disease prevention, it is a good idea to include a coccidiostat (Bovatec®, Rumensin®, or Deccox®) and urine acidifier (e.g. ammonium chloride) in the creep ration. The ratio of calcium to phosphorus should be at least 2:1 to prevent urinary calculi in male lambs and kids.

Creep-fed lambs and kids are more susceptible to enterotoxemia, "classical" overeating disease (clostridium perfringens type D). Their dams should be vaccinated approximately one month before parturition. Lambs and kids should be vaccinated after their cloistral immunity wanes, at approximately 6-8 and 10-12 weeks of age.

Lambs and kids from unvaccinated dams should receive their first vaccination for overeating disease when they are approximately four weeks old, followed by a booster four weeks later. Earlier vaccines are not likely to be effective due to the immature immune system of young lambs and kids and interference of the maternal antibodies.

Overeating disease most commonly affects the fastest growing lambs and kids, usually past a month of age.

Creep feeding is a common practice in the sheep and goat industry. All producers need to evaluate the appropriateness of the practice for their production and marketing systems. For creep feeding to be economical, the higher value (extra weight and higher prices) of creep-fed lambs and kids needs to exceed the cost of the creep feed.

Creep feeding may not always be economical, especially on farms with high quality forage. Creep feeding is more likely to be cost-effective with lambs than goats.



# Manure Injection for Corn Silage in Conservation Till, Strip Till and No-Till Conditions

by Martin L. Battaglia, Quirine M. Ketteringsa, G. Godwina, Karl J. Czymmek, a,b  
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## Introduction

Conservation tillage practices and incorporation and injection of manure have increased in New York State over the last 20 years. In the future, it is expected that dairy farmers will need to make significant further progress toward no-till practices to minimize soil erosion losses and maximize soil health and carbon sequestration. Compared to surface application of manure, incorporation and injection can reduce ammonia volatilization, odor emissions and nutrient losses, particularly phosphorus (P), in water runoff. However, shallow incorporation of manure with an aerator tool or similar full-width tillage implements, while effective at retaining nitrogen (N) and P (Place et al., 2010), does not meet no-till practice standards as defined by USDA-NRCS. Injection of manure is only compatible with no-till and reduced tillage if low disturbance equipment is used. One central question is: are conservation tillage practices, including no-till planting and zone building, compatible with systems where manure is spring-injected in New York.

## Field studies

Two types of studies were conducted on dairy farm fields in western New York. The first study (2012-2013) evaluated the impact of zone tillage depth (0, 7 and 14 inches). This study was completed on one field in 2012 and two fields in 2013. An aerator was used for seedbed preparation. The second study (2014-2016) evaluated three intensities of conservation tillage, including no-tillage, reduced tillage (aerator without zone tillage), and intensified reduced tillage (aerator plus zone tillage at 7 inches depth). This study was conducted on two fields each year.

All fields had a zone tillage and a winter cereal cover cropping history of more than 10 years. Fields were in a dairy rotation of typically 3-4 yr corn alternated with 3-4 yr alfalfa/grass. Liquid manure was used as the primary source of soil fertility. It was injected (6-inch depth; 30 inches between injection bands) in March at a rate of about 13,000 gallons per acre (2012 through 2015) or 8,000 gallons per acre (2016) using a manure injector with chisel and sweep tools (Figure 1). Average total N content in manure ranged from 20 to 25 pounds of N per 1000 gallons. Manure P content ranged from 5 to 11 pounds of P<sub>2</sub>O<sub>5</sub> per 1,000 gallons, while solids content varies from about 5 to 10%.



Figure 1. Manure injector with chisel and sweep tools utilized in zone tillage depth and tillage intensities studies conducted in western New York between 2012 and 2016.

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In both types of studies, zone tillage was performed in late April using an 8 row (30 inch) zone builder with subsoiler shanks and a 20-foot wide aeration tool set at a 15 degree angle pulled in tandem. Corn was planted at 15-inch corn row spacing at a rate between 34,000 and 35,000 seeds per acre between April 30 and May 13. No sidedressing of N was done given practical limitation of 15-inch corn row spacing. Each year, we measured early growth parameters (plant biomass, leaves per plant, stand density, and plant height at V5), and took soil samples at V5 that were analyzed for the pre-sidedress nitrate test (PSNT). At harvest we took corn stalks and analyzed them for the corn stalk nitrate test (CSNT), determined silage yield and dry matter content as well as forage quality parameters including crude protein (CP), acid detergent fiber (ADF), and neutral detergent fiber (NDF).

## Results

Average plant density at V5 ranged between ~31,600 and 32,700 plants per acre (between 90 and 96% of the seeding rate). Reduced tillage and even omitting tillage altogether did not impact early corn silage stand density (Table 1).

In both types of studies, and for all fields, the PSNT-N exceeded 21 ppm NO<sub>3</sub>-N, indicating sufficient N from manure and soil organic matter mineralization. The PSNT results also indicate no impact of tillage practice or depth on mid-season N availability (Table 1). Silage yield averaged about 25 tons per acre (at 35% dry matter) in the tillage depth study, with 7.8% CP. In the tillage intensity studies, yields averaged about 23 tons per acre with 7.3% CP. The results should not be compared between the two types of studies as trials were conducted on different fields and across different growing seasons. Tillage depth or intensity did not impact yield or CP content in either of the studies (Table 1).

The CSNT-N ranged between 3,235 and 3,589 ppm NO<sub>3</sub>-N in the zone tillage depth, and between 2,315 and 2,753 ppm NO<sub>3</sub>-N in the tillage intensity study, above the 2,000 ppm NO<sub>3</sub>-N optimum range. Zone tillage depth and different tillage intensities did not impact CSNT-N and both PSNT-N and CSNT-N show N was not limiting plant growth (Table 1).

## Conclusions and Implications

All types of tillage systems and depths performed equally well in terms of plant growth, N availability, corn silage yield and quality suggesting that reduced tillage and no-till can both be viable options to more intensive tillage for this farm. Results might be different for fields with limited history of zone building and other efforts to improve soil health. We conclude that at this farm that has made significant efforts to adopt soil health practices, manure injection followed by no-till planting or zone building can sustain yields and conserve N. No-till planting has the additional benefit that it reduces soil disturbance, risk of P runoff, as well as tillage-associated fuel, equipment, and labor costs.

**Table 1.** Plant density and pre-sidedress nitrate test (PSNT) at V5, and corn stalk nitrate test (CSNT), silage yield [35% dry matter (DM)], crude protein (CP), and acid and neutral detergent fiber (ADF, NDF). NT = no-till; RT = reduced-tillage (aerator without zone tillage); RT+ = intensified reduced-tillage (aerator plus zone tillage) in 2014, 2015 and 2016.

	Density	PSNT	CSNT	Silage yield	CP	ADF	NDF
Zone tillage depth (inches)	Plants per acre	--ppm NO <sub>3</sub> -N--		tons per acre	----% of total DM----		
0	32,597	29	3,589	25.0	7.8	23.1	41.5
7	32,706	29	3,498	24.8	7.8	22.8	41.1
14	32,561	28	3,235	25.0	7.7	23.3	41.5
<b>Tillage intensity</b>							
NT	31,617	38	2,315	23.0	7.3	22.9	42.0
RT	32,071	43	2,753	23.1	7.2	23.2	42.5
RT+	32,507	38	2,565	23.1	7.3	23.1	42.3

# How Epigenetics is Impacting Your Dairy Herd

By David R. Balbian, Regional Dairy Management Specialist

The first thing you are probably asking is “what is epigenetics?” It is the study of how behaviors and the environment can cause changes that affect the way your genes work. So, how does that apply to my dairy herd? Dr. Michael Van Amburgh at Cornell has done some early research on epigenetics in dairy cattle. A brief statement on the Cornell Animal Science website summarizing some of Dr. Van Amburgh research states the following: “... recent work has demonstrated that early life nutrient intake and growth rates prior to weaning have an epigenetic or developmental effect on the calf that results in greater milk yield over the life of the animal as an adult. Further, in collaboration with some colleagues, we were able to demonstrate that pre-weaning growth rates accounted for up to 25% of the variation in first lactation milk production. This is a significant finding and one that provides us with a new direction and with profound implications for early life management of calves and heifers. Further, as part of the research into early life, we have started to understand the role that components of colostrum play in communicating to the neonate and are currently conducting work to appreciate the effect of those lactocrine signals.” Lactocrine signaling is the communication of milk-borne bioactive factors (MbFs) from mother to offspring.

We all know that quickly getting colostrum into that newborn calf has tremendous benefits in increasing immunity in that calf. We are beginning to understand that a second feeding of colostrum and early milk feedings, that we would typically not consider colostrum, also have benefits to the calf. More research still needs to be done to determine and fully understand what the impacts are and the mechanisms by which they are triggered.

Some exciting additional work in the field of epigenetics has recently been published. It involves the impact that heat stress during the late dry period has on the unborn calf. This is not excessive heat stress, but heat stress that we would typically experience in upstate New York. Calves born to cows that experienced heat stress during the dry period had lower birth weights, lower weaning weights, and poorer immune development. These calves also produced less milk once they entered the milking herd. These negative impacts were then passed on to their offspring. This work is showing that the negative effects on the unborn calf are permanent and multigenerational. In other words, not only does this stressor affect the calf that was exposed to heat stress prior to birth, but that animal then passes along those negative impacts to all of their offspring.

Multiple studies with young calves have shown that when heat stressed animals are provided heat abatement, feed intake and growth rates are improved. Work done by Dr. Jimena Laporta from the University of Wisconsin has provided us with some recommendations for heat abatement in young calves based on calf responses to the environment. Her research group proposes that heat abatement should be implemented in calves when the THI (Thermal Heat Index) is above 65 to 69. THI is commonly used as a practical indicator for the degree of stress on dairy cattle caused by weather conditions because THI incorporates the effects of both ambient temperature and relative humidity in an index.

# Headlands Often Reduce Overall Field Yield. Are They Worth Fixing?

by S. Sunoja, Dilip Kharela, Tulsi Kharela, Jason Choa, Karl J. Czymmek<sup>a,b</sup>, Quirine M. Ketterings<sup>a</sup>  
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## Introduction

Headland areas are defined as the outer edges of the field where farm equipment turns during field operations such as planting, sidedressing and harvest and where hedgerows or other physical features separate a field from adjacent fields or other land uses. The equipment traffic areas can be compacted which can cause considerable yield loss. Beyond compaction, yield loss in headland areas may also reflect edge-feeding of pests such as birds, rodents and deer, and competition for light, water, and nutrient resources with adjacent tree lines. Better decisions about headland management including investments to improve production potential, planting of other crops, or reductions in fertility or other crop inputs can be made when we know how much yield is given up on headlands. In the past several years, we have provided farm specific yield reports to farmers who have shared their corn silage and grain yield data with us. The reports included yield by field with and without headland areas included. Here we put all that information together, across farms, to evaluate how much corn grain and silage yield may be lost on headland areas across fields.

## Corn Grain and Silage Yield Data

Corn yield data from 2648 fields representing ~49000 acres across 63 farms in New York were analyzed. This included 1281 corn grain fields and 1367 corn silage fields across two years (2017 & 2018). The yield data from each field were processed and cleaned using Yield Editor (free software from USDA-ARS) following the cleaning protocol developed by the Nutrient Management Spear Program at Cornell University (Kharel et al., 2020). Headland removal was performed in Yield Editor by manually selecting the outer edge passes and deleting the data points (Figure 1).

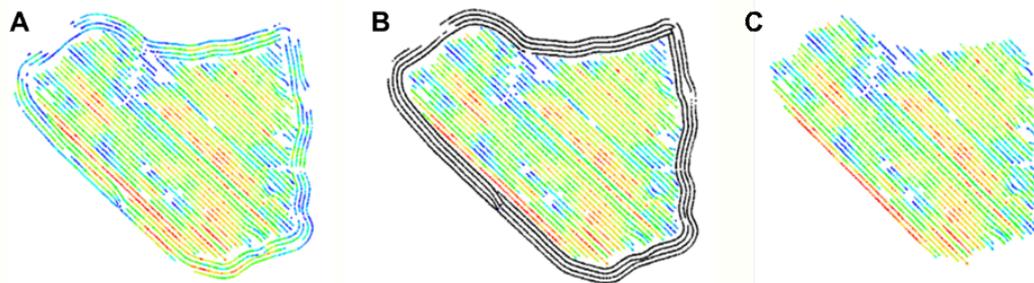


Figure 1. Headland areas were removed using Yield Editor. Shown are (a) cleaned yield data including headland areas, (b) selected headland areas represented in black, and (c) yield in non-headland areas (i.e. after removal of headlands). Adapted from Sunoj et al. (2020).

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Average field size ranged from 18.5 acres per field for grain and 19.3 acres per field for silage. Corn grain yields averaged  $181 \pm 33$  bu/acre versus  $22 \pm 5$  tons/acre for corn silage. We calculated optimal production, defined as production that could be obtained if the headland portion had yielded the same as the non-headland portion. We calculated production gain as the percentage increase between the actual and optimal production.

## **Results**

Across all fields, the yield in the headland area was lower than the yield of the non-headland area (Figure 2A) for 94% of the grain fields and 91% of the silage fields. For some fields, the headland area yielded more than the non-headland area, possibly due to: (1) within-field features (e.g., trees, wet spots, alley ways), (2) irregular shapes of fields with short passes (as typically seen in New York agriculture), and (3) multiple directions of harvest within a field. The average yields were 188 bu/acre (non-headland area) and 161 bu/acre (headland areas) for corn grain. For silage, the average yields were 22.6 tons/acre (non-headland area) and 18.9 tons/acre (headland areas). Thus, headland yields were 14% (grain) and 16% (silage) lower than yields in the non-headland areas.

If the headlands yielded as much as the non-headland area, the production gain ranged from -8 to 32% for corn grain, and from -17 to 42% for corn silage (Figure 2B). The negative production gains reflected field that yielded more on the headland areas than the non-headland areas (points below the 1:1 line in Figure 2A). Averaging across all fields, the production gain amounted to about 4% for both corn grain and silage fields. However, 1% of the grain and silage fields had a potential production gain that exceeded 20%; 25% of the grain fields and 28% of the silage fields had gains between 5 and 20%, while for the rest of the fields (74% and 71%) potential yield gains were less than 5%. Production gains exceeding 20% were obtained on fields with the total field area was less than 25 acres, and with corn grain yields less than 143 bu/acre and silage yield less than 24 tons/acre. Such yield differences can, depending on the farm, reflect a considerable loss of yield and opportunity to improve total returns per cropland area.

## **Conclusions and Implications**

Yield in headland areas was, on average, 14% (grain) and 16% (silage) lower than in the non-headland areas of the field. Taking into account the total percentage of a field in headland, at the field and farm levels, the potential yield gain amounted to 4%. The overall averages conceal the wide range of production gain values obtained in New York fields, from negative up to 32% for corn grain and up to 42% for some corn silage fields. Based on production gain for specific fields, farmers can either choose to 'repair' the headland with management (e.g., vertical tillage or subsoiling) to increase overall productivity and return on investment in seed and crop inputs, reduce crop inputs without further loss of yield in headlands, or 'retire' the headland from main crop farming and opt for perennial hay crop and conservation uses.

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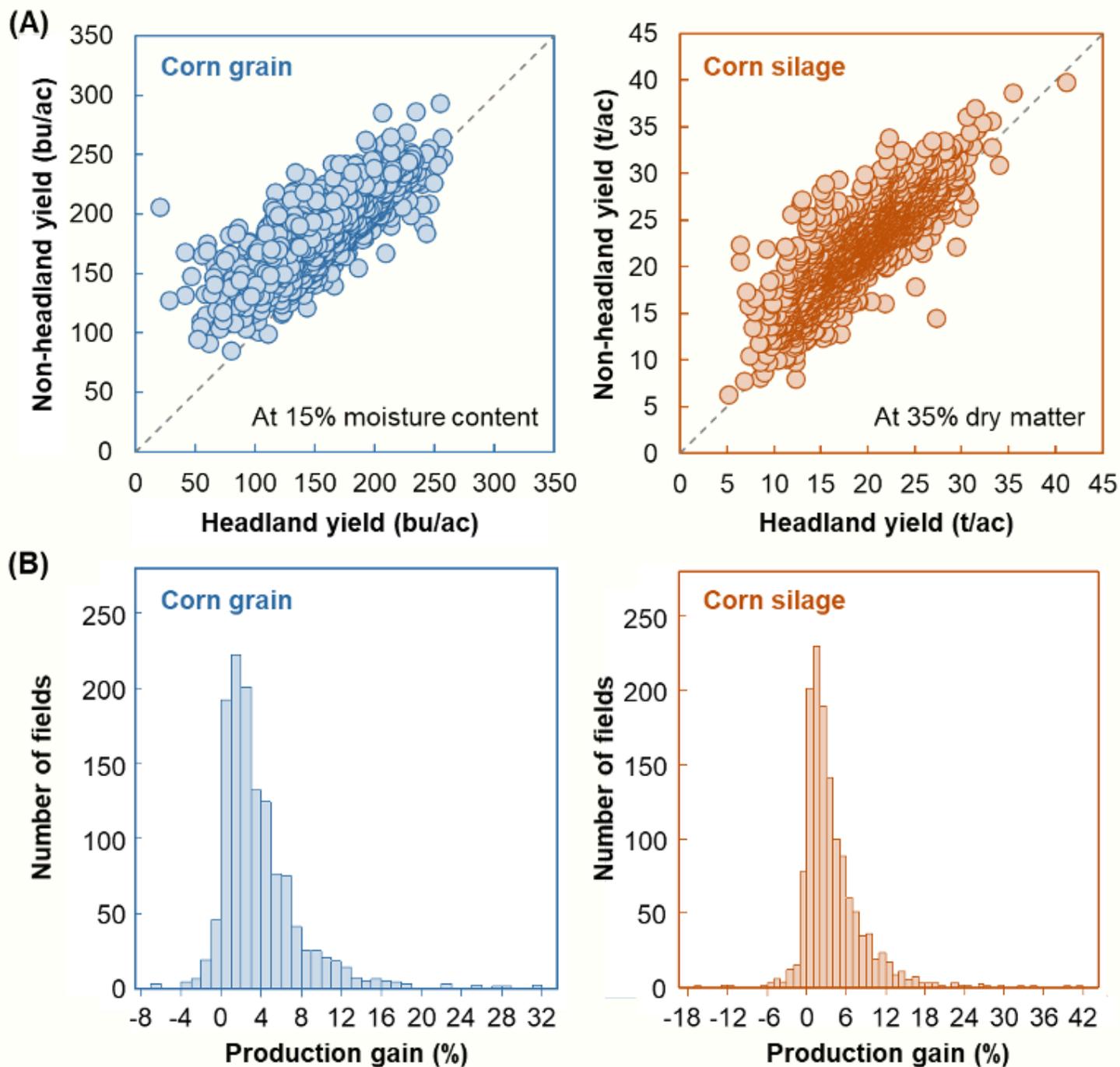


Figure 2. (A) Field scale yield in headland versus non-headland for corn grain and silage; and (B) distribution of production gain across all fields. Each circular marker in (A) represents a field. Adapted from Sunoj et al. (2020)

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