Imperial County Agricultural Briefs

University of California
Agriculture and Natural Resources

UC Cooperative Extension

Features from your Advisors

June 2019 (Volume 22 Issue 6)

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POTENTIAL PESTS OF QUINOA AS OBSERVED FROM DREC RESEARCH TRIAL

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Varieties of quinoa, *Chenopodium quinoa,* are being tested as a potential low desert crop at the University of California Agriculture and Natural Resources (UCANR) Desert Research and Extension Center (DREC) as part of the agronomy program. In our previous Ag Brief article [1] we discussed the potential of quinoa as a low desert alternative crop. The purpose of this article is to expand on that article regarding potential pests of quinoa per our observation from the research trial and some literature review. In order to gauge the potential of quinoa as a low desert crop, growers may need to know what pests to expect and what control methods to take during the growing seasons. Trial varieties were planted mid-December 2018 and harvested during the last week of May 2019. The different types of pests observed during these growing seasons are listed and described below;

Pale Striped Flea Beetle, *Systena blanda*

Quinoa may be susceptible to extensive damage from pale striped flea beetle (Figure 1) during its seedling stage. At UC DREC research fields, flea beetle damage started about 40 days after planting. The pale striped flea beetles are described to be about 3mm long beetles with two pale-yellow vertical stripes running down their backs. They have large hindlegs that allow them to jump many times their body length. They are likely to hide during the day, so detection of the pest is usually through the damage they leave behind. Adult flea beetles feed on the undersides of the leaves, causing holes to form. Flea beetles can cause significant economic damage on younger stages of plant growth, such as cotyledon and two-leaf stage, but are not a problem on older well-established plants. In large numbers, flea beetle feeding can stunt the growth of or kill the seedling. In the research field, no flea beetle management was warranted as the damages were not significant. These beetles appeared only once every two weeks and

Figure 1 Flea beetle damage on quinoa seedling

quickly disappeared. The lower winter temperatures at DREC may have hindered the activity of these beetles, although pale-striped flea beetles are capable of overwintering. Currently, no pesticides are registered for quinoa. For other crops such as sugar beets and carrots, insecticides in the carbamate and pyrethroid groups are used against the striped flea beetles. Cultural methods recommended for controlling flea beetle include removing weeds and plant debris so that flea beetles will have no place to overwinter. [2]

Beet Armyworm, *Spodoptera exigua*

Quinoa may be susceptible to damages from beet armyworms, particularly the larvae. Beet armyworm larvae (Figure 2) are small mottled juvenile and are usually dark green in color with a pale stripe running along the sides of their body. The larvae are known to feed on both foliage and fruit of crops but are mostly foliage feeders. Egg masses are laid on the crop in numbers ranging from 50 to 150 eggs per mass. Once hatched, the early instar larvae feed in groups and can skeletonize leaves as they slowly disperse through the plant. A larger, later instar larva can eat large irregular holes in the foliage. At high infestation levels, beet army worms are described as causing leaf defoliation in quinoa at early stages of its development [3]. Beet army worm were observed in our quinoa trial fields but were not causing any significant damage. Armyworm presence was low and there was very little evidence of feeding damage on the surrounding foliage. We conducted a subsequent follow up survey on armyworms when average temperature increased and there was little evidence of armyworm damage. The army worm population did not reach a high density at all. Beet armyworm has a wide host range and is known in the Imperial valley for its presence in sugar beets, alfalfa, and various vegetable crops. Control of the beet armyworm on the large variety of host crops is done through a broad range organophosphates and carbamate insecticides. Army worm control methods are not recommended for small grains, because armyworm seldom cause severe economic loss on small grain crops. [4]


Figure 2 Beet armyworm in an inflorescence of quinoa.

Green Stinkbug *species variable*

Quinoa plants could be susceptible to seed damage and yield loss from stink bugs feeding damage at both flowering and ripening stages. Stink bugs are described to have a characteristic pentagon or shield like body shape with a large triangle on their dorsal side. Stinkbugs are hemipteran and feed through their sucking piercing mouthparts. Stinkbug damage on small grains can be characterized by discoloration, misshapen or desiccated seeds. Most of the damage is sustained on the seed when development is milking or dough stage.

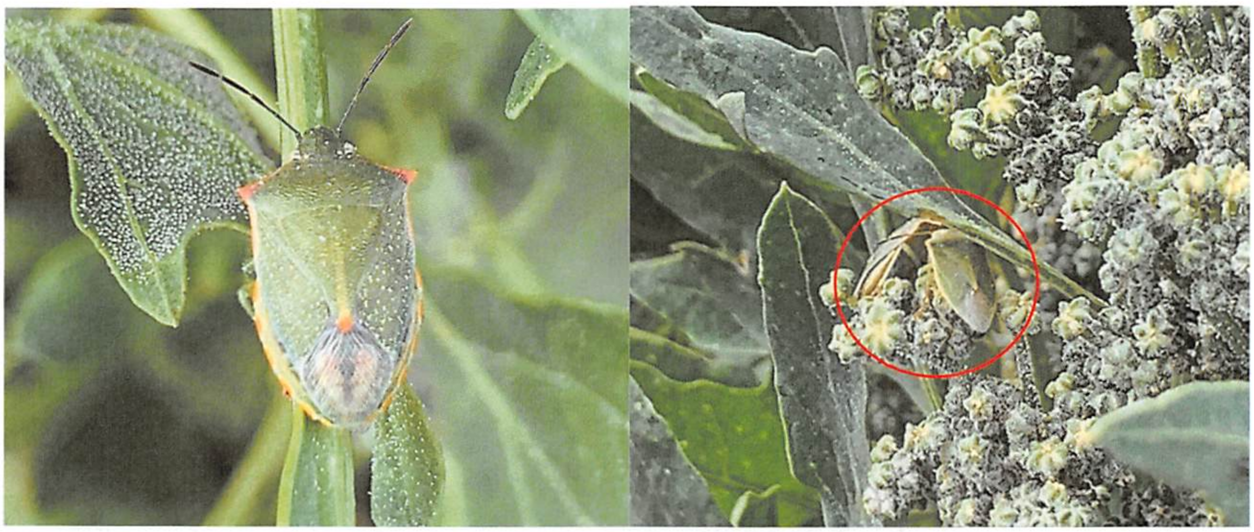

Figure 3 Green stink bugs seen on quinoa

Pentatomid bugs or stink bugs of different species have been known to cause damage to quinoa in the Peruvian coast where quinoa is commercially produced. The red shouldered Green stinkbug is a common pest in the desert regions of southern United States. In these southern regions, this pest was observed to feed developing seedpods of quinoa, resulting in shriveled and desiccated seeds. Although, stink bugs can be a potential problem on the low desert quinoa, we did not record significant population density in our research fields. [5]

Aphids several species

During our field survey at the DREC quinoa research field, we spotted a few varieties of aphids. Aphids are small insects that are varied in color from green to black. They can generate many offspring in a short time. Aphids feed by puncturing the outer cells of a plant and in severe cases could cause cosmetic damage on the leaves or hinder development of young plants. Aphids found in the Imperial Valley are neither known to be a severe pest of small grains nor do they spread quinoa related disease. Cowpea aphids that we observed at our research field are shown in Figure 4. We also observed green peach aphids during mid-March, but only the winged forms. Aphid population at the research field did not reach high density. Temperature fluctuations above 90°F are known to lower population densities significantly, so they may not be a foreseeable pest problem as. Generally, aphids can be managed through monitoring and releasing natural enemies such as lady beetles, syrphid fly larvae, green lacewings, and parasitic wasps. If predator population is low, a grower may then consider further control measures. [6]

Figure 4 Cow pea aphids. ***Note: the powdery residue featured in our picture may be plant response to soil salinity***

False Chinch Bug

False chinch bugs were observed on the quinoa plants very late into the development of the quinoa. False chinch bugs are 1/8th inch, grayish insects that can quickly aggregate and become abundant. They are known to be polyphagous on different varieties of plants, but their preferred hosts are grain and alfalfa. There is no evidence of false chinch bug feeding damage on leaves, hence are of low potential to be a problem in quinoa production. False chinch bugs are more of a concern on leafy crops than they are on grains, because they can damage young leaves to the point of wilting causing leaf dieback and yield loss, particularly if the crop were damaged in early stages of development. False chinch bug overwinters on weeds and become active when temperatures warm sufficiently and can produce multiple generations per season. At DREC research fields, false chinch bugs were

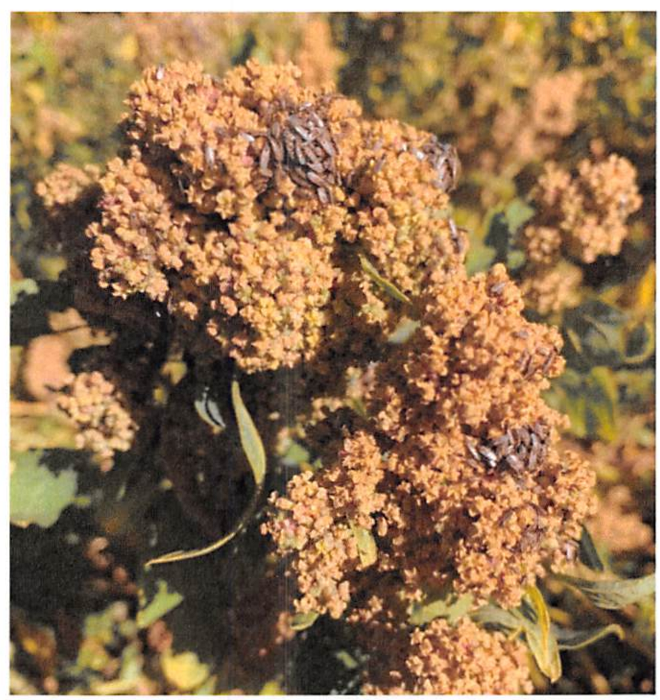

Figure 5 False chinch bug aggregation on maturing quinoa panicles

found aggregated on the quinoa panicles (Figure 5) near maturity of quinoa. They appeared in high densities and appeared to be feeding on both seed panicles and stems. At the time of their presence, quinoa seeds were mostly past hard dough stage and the plant started to defoliate as part of the maturity process. Therefore, there was no visible injury to the seeds or the plant. Some growers express concern that the digestive enzymes from the false chinch bugs feeding mechanism would cause damage to the seed or reduce seed marketability. Chemical control for false chinch bugs is the use of pyrethroids (not yet recommended for quinoa in the low desert). Cultural control methods to control false chinch bug include elimination of winter weeds and plant debris. [7]

Weeds

Weeds were the most time-consuming problem in the research fields. Dominant weeds that appeared in large densities were nettle leaf goosefoot (*Chenopodium murale*). This weed is a common and prolific weed that grows almost year-round in the Imperial valley and is closely related to common lambs' quarter, a problematic weed for quinoa growers in North America. Nettle leaf goosefoot is a broadleaf weed closely related to quinoa, making it difficult for selective herbicide weed control. It poses a strong competitiveness to quinoa, particularly before quinoa's canopy development. At early growth stage, it is difficult to differentiate the weed seedlings from some quinoa varieties. In its later growth stages however, nettle leaf goosefoot grows up to 3 feet with branches stemming mostly from the base of the plant which makes it easier to be differentiated from quinoa. Although the quinoa and goosefoot plants look similar, their flower heads and seeds are different from each other. With proper filtering, the goosefoot seeds can be sorted out as they are smaller in size and are black in color as opposed to the mostly yellow quinoa seeds. No weeds other than goosefoot grew on the research field, for we treated the field with Dual Magnum pre-emergent herbicide. Further research is necessary to identify herbicides that can be tolerated by quinoa, especially herbicides targeting small broadleaf weeds [8][9]

Figure 6 Nettle leaf goose-foot growing in between quinoa rows.

In the commercial production of quinoa in its native regions of Chile and Peru, the main weeds that appear in quinoa fields are chiriru (*Bidens Pilosa*), kora (*Malvastrum capitatum*), nabo silvestre (Brassica sp.), and wild quinoa. Wild quinoa varieties have a possibility of cross pollinating with the quinoa if not taken care of in a timely manner [10]. Based on our experience from the research field, weeds and the search for selective herbicide weed control should be the highest priority for successful quinoa production in the Imperial valley. Weed management was the most time intensive and expensive part of our quinoa research. The potential of the weeds to grow back and cause infestation in a short period of time following mechanical weed control made it difficult to keep quinoa at weed free periods.

As for insect pests in the Andean growing regions, *Eurysacca melanocampta* and *Eurysacca quinoae* cause considerable yield loss in commercial production. Other pests, such cutworms and birds also caused damages to cotyledons and inflorescences of quinoa. Insect pests were generally of lower importance and insignificant compared to weed problems. There were no visually observable disease symptoms from the quinoa research field.

For any pesticides mentioned in this article, growers should consult with respective PCA before they use them.

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IS DRIP IRRIGATION A POTENTIAL TOOL TO PRODUCE ORGANIC SPINACH AND MANAGE DOWNY MILDEW?

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Alexander Putman, Assistant Cooperative Extension Specialist, UC Riverside

Figure 1. One of the five monitoring stations set up at the experimental field

Introduction: In a previous Ag Brief article in January 2019, we discussed ideas on our initiated study on producing organic baby spinach using drip irrigation. Currently, no one uses drip irrigation for spinach production, and there is a lack of information on the viability of drip irrigation for spinach production. This project aims to evaluate the viability of drip irrigation for the high-density spinach and also assess the impact of irrigation practices on the management of spinach downy mildew over a two-year period. The first year of the experiment was conducted over two crop seasons (fall 2018 and winter 2019) at the UC Desert Research and Extension Center (UC DREC). Two dripline spacings (three and four lines in 80-inch bed installed at the 1.5-inch depth) was evaluated against sprinkler irrigation as a control treatment. In the winter trial, we also germinated and irrigated 6-spinach bed using drip irrigation throughout the entire crop system to evaluate the possibility of using drip irrigation for plant establishment for the remainder of the season.

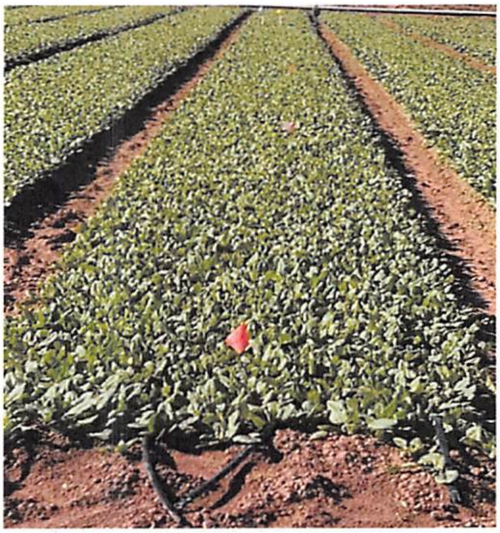

Figure 2. Baby spinach irrigated the entire season by 4-dripline in bed

We noticed that installing driplines on the soil surface is not practical, because the driplines moved around by wind until the crop canopy is fully developed. In addition, surface drip could be problematic for growers since the driplines would need to be removed before harvest and would pose a food safety risk. These are the main reasons why we eliminated the surface drip treatments from our current project trial following observations from the previous fall trial.

A comprehensive data collection was carried out to fully evaluate the impact of irrigation treatments. Some findings and preliminarlty conclusions are presented below:

Canopy crop cover the season: Ground crop cover/fraction is defined as the percentage of plant material that covers the soil surface. Ground crop cover can be a very useful tool for irrigation scheduling. Crop canopy cover percentage was developed for each of the irrigation treatments.

Figure 3 demonstrates the trend of canopy percentage as a function of days after planting. Even though, there were no accurate measurements of canopy cover during the first 10 days after planting, the canopy cover percentages showed that the leaf density under drip irrigation treatments were slightly late (1-3 days depending upon the irrigation treatment) compared to the sprinkler irrigation treatments. We observed individual canopy cover curve for each season which obviously indicates that spinach crop water requirements and irrigation scheduling are different between fall and winter seasons. For instance, an average of 52% and 70% of canopy crop coverage was observed 30 days after planting in the winter and the fall crop season, respectively. We may expect a longer crop season for spinach in winter planting than fall planting in the Imperial Valley, although it may change depending on the weather condition of year.

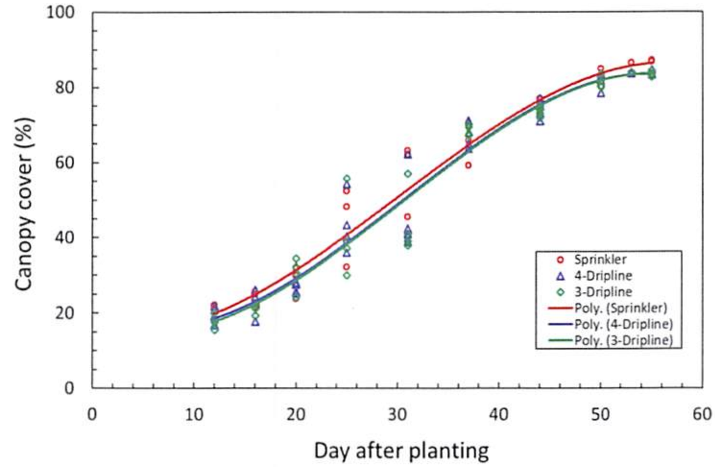

Figure 3. Canopy crop curve for the different irrigation treatments in the fall 2018 trial

Fresh biomass yield: In the fall trial, mean fresh biomass yield for the sprinkler treatment was 12,406 lb/ac, approximately 9% more than the 4-dripline in bed treatment. In the winter trial, mean fresh yield in the sprinkler treatment was 13,281 lb/ac, approximately 7% more than the 4-dripline in bed treatment. Statistical analysis showed a very strong evidence for an overall effect of irrigation system on spinach fresh yield in both the fall and winter trials.

While we couldn't find a significant difference between the sprinkler and the 4-dripline per bed treatment on spinach biomass yield in the winter trial, there was statistically significant yield differences between the sprinkler and the 3-dripline irrigation treatments in the same winter trial.

The yield reduction in drip irrigation treatments compared to the sprinkler irrigation ranged between 7% (the 4-dripline per bed treatment against the sprinkler treatment in the winter trial) and 13% (the 3-dripline per bed treatment against the sprinkler treatment in the fall trial). The yield difference may have likely been caused by irrigation and nutrient management conditions of the drip treatments. Since drip irrigation was tested for the first time for spinach, subsequent trials need to plan for improvements and be conducted in different aspects. However, the 7% yield difference between one of the 4-dripline treatment and the sprinkler treatment demonstrates the potential of drip irrigation for a profitable spinach production. This yield difference could be reduced through optimal system design and a better irrigation and nutrient management practices for drip system.

Spinach Leaf Wetness: We used leaf wetness sensor to measure spinach leaf surface wetness. Figure 4 shows the probe outputs of the sprinkler and drip (4-dripline per bed) irrigations trials for a period of 12 days for the fall season experiment conducted with two irrigation events for each of the irrigation treatments. The results revealed that sprinkler irrigated crop canopies remained wet for 24.3 % more time than crop canopies under the drip treatment for this period.

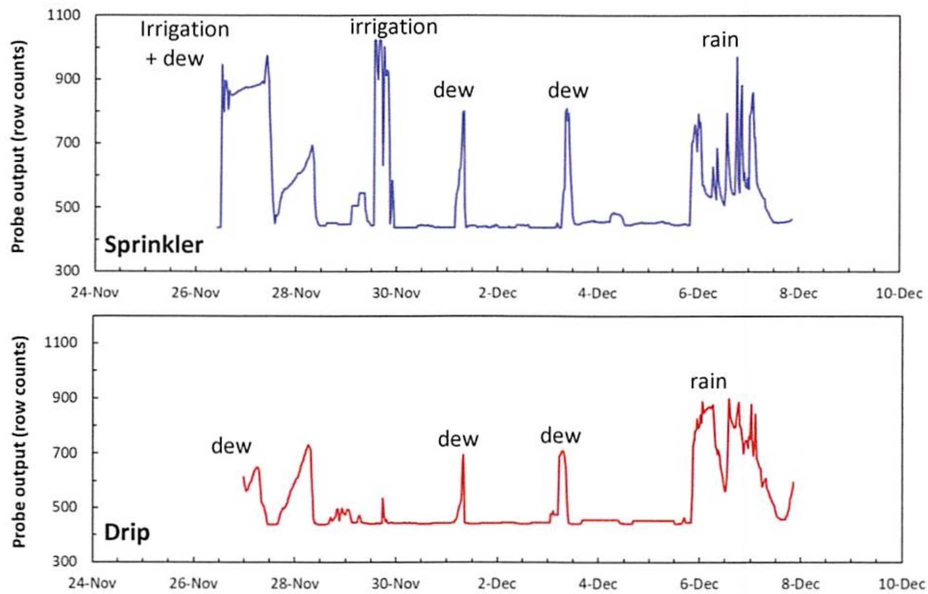

Figure 4. The row counts of leaf wetness sensors at the sprinkler and drip (4- driplines in bed) treatments over a 12-day period in the fall crop season

Crop canopy wetness data may have valuable information for potential downy mildew crop infections. All downy mildew pathogen requires cool, wet conditions for infection and disease development. The dense canopy of spinach retains much moisture and creates ideal conditions for infection and disease development. Our results suggest that sprinkler irrigation could contribute to a higher speed and severity of downy mildew epidemics within a spinach field if other conditions such as temperature are also favorable. Considering the above observation and analysis and that similar weather and farming conditions exist, there could be a higher risk for infection and downy mildew disease development in sprinkler irrigated spinaches compared to spinach irrigated by drip systems.

Downy mildew: Downy mildew was not observed in the fall trial but detected in the winter trial on March 5, 2019. Downy mildew disease incidence was low on March 11, 2019, with only two beds (0.12% and 0.20%, respectively) exhibiting incidences above 0.1% level. Mean downy mildew incidence in sprinkler irrigated plots following seedling emergence was 0.08%. Statistical analysis indicated strong evidence for an overall effect of irrigation treatment on downy mildew. Mean separation of individual treatments showed lower ratings of downy mildew incidences in drip irrigated plots following emergence than the sprinkler irrigated plots.

The most likely mechanism for variations in spinach downy mildew incidences is the reduction in leaf wetness under the under-drip irrigation, which is critical for infection and sporulation by the downy mildew pathogen. Figure 5 shows area of the field with downy mildew infected plants under the sprinkler irrigation treatment of the winter trial.

Figure 5. Area and plants infested by downy mildew at the sprinkler treatment in the winter trial

Other observation and lessons learned: At the winter trial, a germination rate test was conducted 10 days after planting to evaluate the germination rate of sprinkler irrigation (germinated by sprinkler) and beds germinated by drip irrigation.

Although plots germinated by drip were not sufficiently replicated and were not randomized among plots with other treatments, it was worth-while to have an initial idea of germinating spinach with drip irrigations for future experiments. Spinach germination under drip irrigation was approximately three days late compare to plots germinated by sprinkler irrigation. As can be seen from Table 1, germination rate for the initially sprinkler irrigated beds were 96%, 97%, and 95%, respectively for the treatments germinated by sprinkler. Spinach germination rate for the beds drip irrigated had an average of 3% lower germination compare with the sprinkler irrigated beds (Table 1).

Table 1. Germination rate of the different irrigation treatment

Treatment description	Germinated and irrigated the entire season by sprinkler	Germinated by sprinkler and irrigated the entire season by 4-dripline per bed	Germinated by sprinkler and irrigated the entire season by 3-dripline per bed	Germinated and irrigated the entire season by 4-dripline per bed
Germination rate (%)	96	97	95	93

Preliminarily conclusions: Drip irrigation demonstrated the potential to be used to produce organic spinach, conserve water, enhance the efficiency of water use, and reduce/manage downy mildew disease incidences. Statistical analysis of the data indicated a strong evidence for overall variation in irrigation system on spinach fresh biomass yield and downy mildew disease incidences. A Lower spinach yield could be likely caused by irrigation and nutrient management conditions under the drip irrigation at this point, where it is tried for the first and initial time. Subsequent drip irrigation trials for spinach production trials can be optimized with improved practices when using drip irrigation. Similarly, yield difference between drip and in sprinkler irrigated spinaches could be reduced through optimal system design and better irrigation and nutrient management practices in drip irrigation system. Further trials are needed to evaluate the viability of utilizing drip (optimal system design, the impacts of irrigation and nitrogen management practices, and strategies to maintain spinach productivity and economic viability at spinach).

Acknowledgement: This research was supported by the California Leafy Greens Research Board.

LIVESTOCK RESEARCH BRIEF

UC CE | University of California Agriculture and Natural Resources | Cooperative Extension

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Holtville, CA, 92250
(442) 265-7700

Hello,

In this June 2019 edition, a study addressing the effect of non-structural carbohydrate concentration in the diet on growth performance in calf-fed Holstein steers is reviewed.

ATTENTION PRODUCE GROWERS AND LIVESTOCK PRODUCERS:

On June 11, 2019, CDFA and UC Davis will be putting on the California Good Ag Neighbors workshop at UC DREC (1004 E Holton Rd, Holtville, CA) from 9 am to 4 pm. This workshop will address the produce safety – livestock interface through discussions on what we already know and what we can do to advance food safety. Produce growers and livestock producers are invited to attend and participate in these critical conversations. For more information and to register, please see the attached flyer or go to www.wifss.ucdavis.edu/good-ag-neighbors.

If you have any comments, questions, recommendations, or know someone who would like to be included on the mailing list, please feel free to contact me.

Best wishes,

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EFFECT OF NON-STRUCTURAL CARBOHYDRATE CONCENTRATION ON PERFORMANCE AND CARCASS CHARACTERISTICS OF FEEDLOT HOLSTEINS

Brooke Latack
Livestock Advisor

Introduction

Throughout the growing-finishing phases, calf-fed Holstein steers are typically fed energy dense, steam flaked corn-based diets characteristically high in non-structural carbohydrates (sugar and starches). Due to the protracted nature of the feeding period, the risk of occasional digestive upset under this practice is appreciable. Whereas increasing dietary fiber concentration may reduce the potential for digestive dysfunctions, it may also put at risk energy intake, and hence daily weight gain and gain efficiency. This study aimed to compare calf-fed Holstein steer performance and carcass characteristics when dietary non-structural carbohydrates is reduced from 64% to 51%.

Methods

60 Holstein steers (192 ±2.2 kg) housed at the UC DREC feedlot were sorted into 10 pens (6 animals per pen). Five pens were fed a diet with 51% non-structural carbohydrates (HF) and the other five pens were fed a diet with 64% non-structural carbohydrates (LF). Diet composition for both diets is found in Table 1.

Results and Implications

The HF diet had an 8.8% increase in ADG during the first 112 d compared to the LF diet. Throughout the remainder of the study the HF diet had a 4.9% greater ADG than the LF diet. Due to distiller's grains being used to achieve the different carbohydrate concentrations, the increased protein in the HF diet from the DDGs may have in part contributed to this difference. During the initial 112 d net energy and feed efficiency were greater for the HF diet. Throughout the study there was no difference in DMI.

The carcass weight of steers fed the HF diet were greater than those on the LF diet, which is consistent with the increase in ADG. No other treatment differences in carcass characteristics were apparent.

Ultimately, this study demonstrated that reducing the non-structural carbohydrate concentration in a conventional steam flaked corn-based feedlot diet can enhance growth performance of calf-fed Holstein steers, most especially during the early growing phase.

Table 1.
Experimental diet composition

Ingredient Composition, % DM		
	Non-structural carbohydrates (%)	
Item	51	64
Steam-flaked corn	54.65	76.23
DDGs	15.00	0.00
Alfalfa hay	14.00	6.00
Sudan grass hay	6.00	6.00
Molasses cane	6.00	6.00
Yellow grease	2.00	2.00
Urea	0.50	1.30
Limestone	1.00	1.27
Magnesium oxide	0.15	0.15
Trace mineral salt	0.40	0.40
Dicalcium phosphate	0.30	0.65

Table 2.
Growth performance treatment effects

	Non-structural carbohydrates (%)	
Item	51	64
No. of pens	5	5
BW, kg		
Initial	127.5	131.2
112	280.0	270.3
224	511.6	497.4
Final	591.9	573.8
ADG, kg/d		
1-112 d	1.36	1.24
112-224 d	1.68	1.63
224-308 d	1.46	1.42
1-308 d	1.50	1.43
DMI, kg/d		
1-112 d	5.66	5.62
112-224 d	9.72	9.18
224-308 d	11.89	11.34
1-308 d	8.83	8.48
ADG/DMI		
1-112 d	0.240	0.220
112-224 d	0.173	0.178
224-308 d	0.123	0.126
1-308 d	0.170	0.169
Dietary NE (Mcal/kg)		
1-112 d		
NE_m	1.93	1.83
NE_g	1.29	1.20
112-224 d		
NE_m	2.03	2.05
NE_g	1.37	1.39
224-308 d		
NE_m	1.97	1.99
NE_g	1.32	1.33
1-308 d		
NE_m	2.01	2.00
NE_g	1.35	1.35

Table 3.
Carcass characteristic treatment effects

	Non-structural carbohydrates (%)	
Item	51	64
Carcass weight (kg)	366.4	355.2
Dressing %	61.6	61.5
LM area (cm^2)	79.9	80.3
Fat thickness (cm)	0.84	0.77
KPH fat (%)	2.27	2.28
Yield grade (%)	51.96	52.22
Marbling score	4.08	4.61

References

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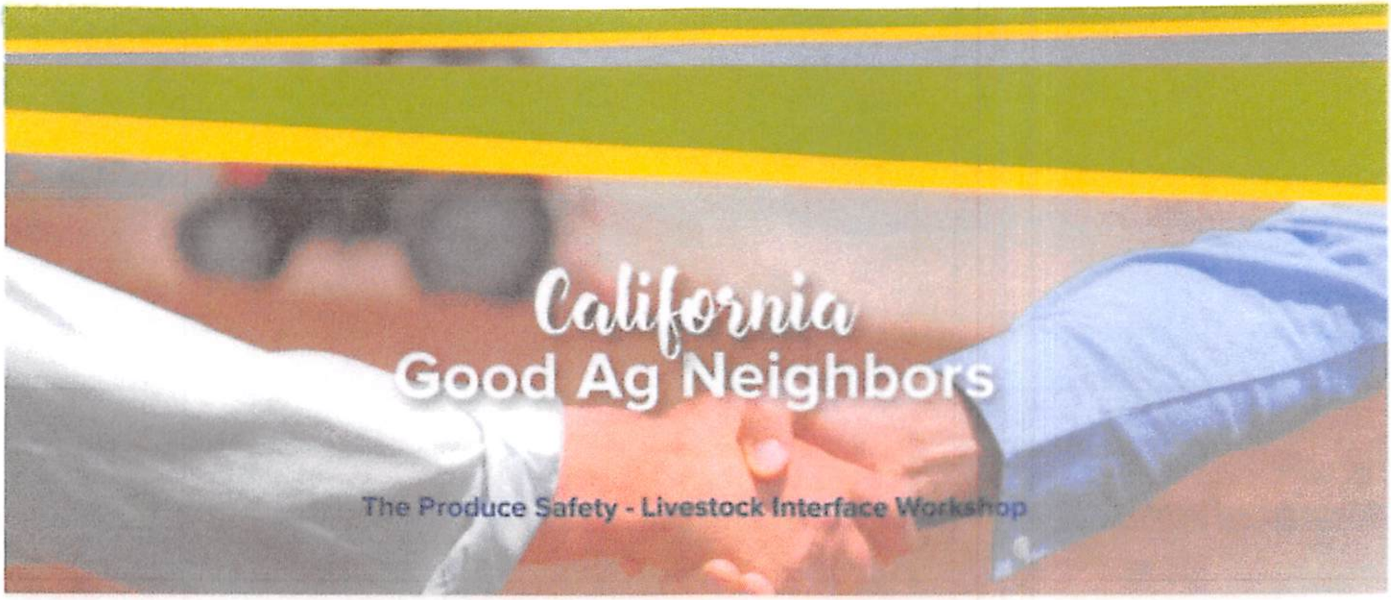

Perhaps no issue in agriculture is as complex as that of the safety of fresh produce grown in the vicinity of livestock and wildlife. Animal operations and fresh produce growers in California are among the most highly regulated in the country but confusion often exists about what each community does to help keep our food safe.

Join us for one of two workshops where food safety scientists, regulators, produce growers and livestock farmers can share what we already know about the produce safety-livestock interface and how we can leverage existing efforts to make food even safer.

Sponsored by the **California Department of Food and Agriculture** and the **University of California – Davis**, using cooperative funding from the **Food & Drug Administration**, this workshop promises to be enlightening and useful as we explore collaborative methods advancing food safety.

June 11, 2019

9am to 4pm
Desert Research & Extension Center
1004 East Holton Rd
Holtville, CA 92250

June 13, 2019

9am to 4pm
Robert J Cabral Agricultural Center
2101 E. Earhart Ave
Stockton, CA 95206

Register at www.wifss.ucdavis.edu/good-ag-neighbors

This event brought to you by:

cdfa — California Department of Food & Agriculture
UC Davis WIFSS — Western Institute for Food Safety & Security
WCFS — Western Center for Food Safety
University of California — Agriculture and Natural Resources

Questions?
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IMPERIAL VALLEY CIMIS REPORT AND UC WATER MANAGEMENT RESOURCES

Ali Montazar, Irrigation and Water Management Advisor, UCCE Imperial and Riverside Counties

The reference evapotranspiration (ET_o) is derived from a well-watered grass field and may be obtained from the nearest CIMIS (California Irrigation Management Information System) station. CIMIS is a program unit in the Water Use and Efficiency Branch, California Department of Water Resources that manages a network of over 145 automated weather stations in California. The network was designed to assist irrigators in managing their water resources more efficiently. CIMIS ET data are a good guideline for planning irrigations as bottom line, while crop ET may be estimated by multiplying ET_o by a crop coefficient (K_c) which is specific for each crop.

There are three CIMIS stations in Imperial County include Calipatria (CIMIS #41), Seeley (CIMIS #68), and Meloland (CIMIS #87). Data from the CIMIS network are available at: http://www.cimis.water.ca.gov/. Estimates of the average daily ET_o for the period of May 1st to July 31th for the Imperial Valley stations are presented in Table 1. These values were calculated using the long-term data of each station.

Table 1. Estimates of average daily potential evapotranspiration (ET_o) in inch per day

June	June		July		August	
	1-15	16-30	1-15	16-31	1-15	16-31
Calipatria	0.31	0.32	0.32	0.31	0.30	0.28
El Centro (Seeley)	0.34	0.36	0.33	0.31	0.30	0.28
Holtville (Meloland)	0.33	0.34	0.32	0.31	0.30	0.28

For more information about ET and crop coefficients, feel free to contact the UC Imperial County Cooperative Extension office (442-265-7700). You can also find the latest research-based advice and California water & drought management information/resources through link below:

http://ciwr.ucanr.edu/.