Temporal Implications of the Dairy Industry on the Texas High Plains

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Introduction

The dairy industry in the Texas High Plains has expanded rapidly in the past fifteen years. As the number of dairies and overall farm size has increased more inputs like feed and water are needed to support the increased number of cows. The region is home to a thriving agriculture industry, largely due to the presence of the Ogallala Aquifer (Figure 1).

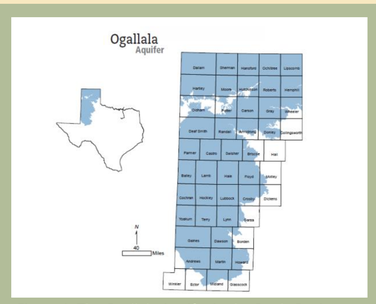

Figure 1. The Ogallala Aquifer in the Study Region

The aquifer allows crops to be grown in the semi-arid region by providing the groundwater necessary for irrigation. The ability to irrigate crops is especially important to dairies since a typical dairy cow ration relies heavily on silage (Table 1). Silage has a high moisture content, making it difficult and expensive to import into the region. Therefore, silage must be grown in close proximity to where it will be consumed (Guerrero et al., 2012).

Dairy Rations		
Input	As Fed (lbs)	% of Total Ration
Total Forage	81.8	76%
Alfalfa	8.4	8%
Total Silage	73.3	68%
Corn Silage	49.1	46%
Sorghum Silage	8.2	8%
Small Grains Silage	16.1	15%
Concentrate	15.9	15%
Cotton Seed	4.9	5%
Protein	3.8	4%
Minerals	1.0	1%
Total	107.4	1

Table 1. Dairy Cow Ration

It is expected that crop composition will have changed in order to support the dairies in the region. These changes have created concern that the aquifer is being depleted faster than it can recharge. Conversely, dairies are having a positive impact on the regional economy, generating over $1.3 billion from the years 2011-2014 in the Texas Panhandle (Amosson et al., 2015). The contributions of the dairy industry and the effects they have on rural communities should be considered in addition to the long-term impacts they have on the aquifer and the landscape of the region.

Factors influencing the establishment of dairies in the study region:

- Availability of land
- Affordability of inputs
- Lower population density
- Less stringent environmental regulations
- Supporting satellite industries

Objectives

Assess the impacts of the expanding Texas High Plains dairy industry on:

- Crop composition and forage demand,
- Water usage, and
- Business composition (including type, employment, and income).

Data & Methods

Study Period:

- Pre-Expansion: 1975-1999
- Expansion: 2000-2015
- Post Expansion: 2016-2046

- Dairy cow inventory and crop acreages data were gathered from the USDA's NASS database, along with County Business Patterns data. Dairy cow inventory projections from Texas Senate Bill 4 will be used to evaluate future expansion implications.
- For this poster, the Dallam/Hartley County region of Texas was selected to examine some of the local impacts the dairy industry expansion has created.
- A regression analysis will be completed to examine the strength of the predictive relationship between dairy inventory and changes in business composition. A spatial regression analysis will also be conducted in order to study how the location of the dairies effects various areas of the study region.
- Furthermore, a sensitivity analysis will be performed to see how varying levels of expansion rates may impact these variables 10, 20, and 30 years in the future.

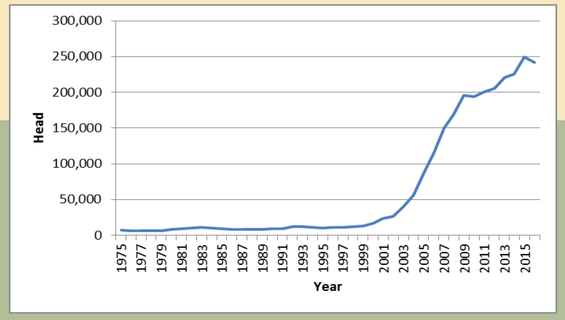

Figure 2 . Dairy Cow Inventory in the Study Area

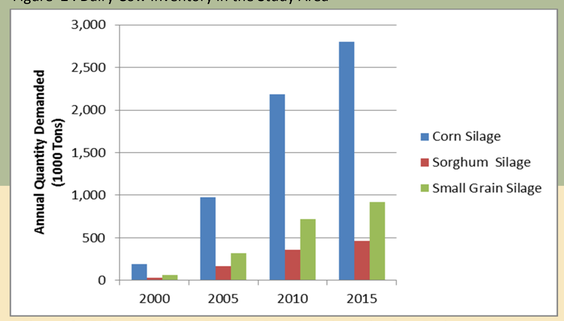

Figure 3 . Estimated Silage Demand Based on the Dairy Cow Ration

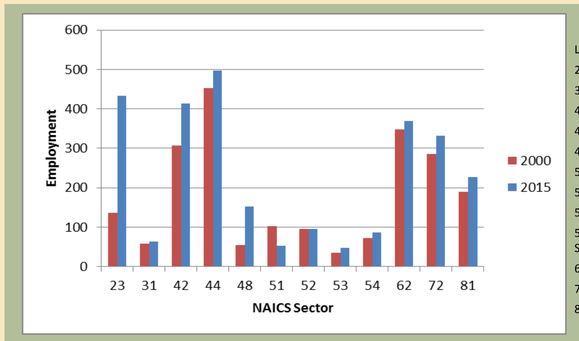

Figure 4. Changes in Employment in Dallam/Hartley Counties

Hilmar locating in the Dallam/Hartley County region of Texas created a high demand for fluid milk. In response, dairy cow inventories skyrocketed from fewer than 300 cows in 2000 to almost 40,000 head in 2015 (Figure 5).

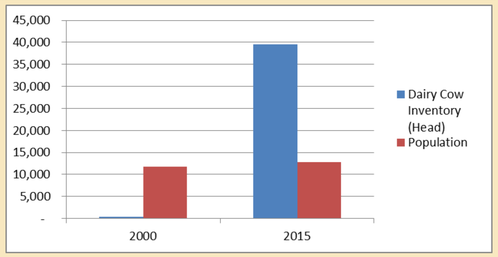

Figure 5. Population and Dairy Cow Inventory in the Dallam/Hartley Region, 2000 and 2015

Discussion

Dairy cow expansion began in 2000 and has continued to increase in recent years (Figure 2). Because silage is a large component of a dairy cow's ration, the amount of silage produced is expected to rise from pre-expansion levels (Figure 3). Water used to irrigate silage crops will come from the aquifer, creating overall water use changes as a result of the dairies' presence.

Hilmar Cheese Company established a plant in the Dallam/Hartley County region in 2005. Employing only 120 people initially, it underwent several expansions in the next decade. It currently employs over 400 workers and has doubled capacity from when it was initially established. This growth reflects the trend seen across the entire study region. Various industry sectors showed an increase in employment during this time period. The construction, transportation, and wholesale trade sectors displayed the most growth (Figure 4), suggesting that the dairies' effects are more wide reaching than just the expected agriculture or manufacturing sectors. Possible explanations include that as population has increased, construction for new houses was needed, and more fluid milk and milk products require transportation.

References

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Ogallala Aquifer
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