Evaluation of wild bird species populations on Washington dairy farms

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Abstract

Washington dairy farmers have estimated annual economic losses from wild bird presence on their farms to range between $1,000 and $200,000 per farm. These losses can occur through the loss of feed, dissemination of pathogens to the dairy cattle, and damages to the buildings. In addition, wild birds may compete with dairy cattle over feed, reducing the amount of nutrients available to cattle and affecting the feeding behavior of cattle. The objectives of this study were to: 1) record the numbers and species of birds present on Washington dairy farms; 2) determine the nutritional losses that occurred due to bird depredation; 3) observe behavioral changes in cattle feeding; and 4) determine the pathogens present in bird fecal matter on dairy farms. Bird count and roosting site data were recorded using direct observations on eleven Washington dairies in the morning and at night for four weeks. A mixed model ANOVA was used to determine if week, time of day, roost sightings, raptor sightings, environmental temperature, and the number of starlings had an effect on the total number of birds. The total number of birds counted was affected by the time of day (P = 0.03), roost sightings (P = 0.02), and week (P = 0.004). Five farms were visited once in the wintertime to collect bird fecal samples, cattle feed samples, and to record behavioral interactions between wild birds and cattle. Bird fecal samples were analyzed for the presence of *E. coli*, *Campylobacter*, and *Salmonella*. Differences in the presence of pathogens and the quantity of pathogens between locations were determined using a log linear model in SAS. Fresh and bird-depleted feed samples were collected by hand and analyzed for dry matter, total digestible nutrients (TDN), protein, crude fiber, ash, fat, and net energy. Linear regressions were conducted in SAS in order to determine the relationship between the feed components and bird density. Intra- and inter-specific aggressive and aversive behaviors, proportion of head gates used, number of cows eating, and the number of birds at the feed bunk were recorded using on-farm cameras. Differences between locations were analyzed using PROC GENMOD in SAS. *E. coli* was isolated in 34/88 of bird fecal samples and *C. jejuni* was isolated in one sample. *Salmonella* was not recovered in any of the fecal samples. There was no statistical difference in the number of samples positive for *E. coli* or the quantity of *E.coli* among locations (P = 0.14; P =0.12). There were no significant differences between bird density and changes in feed components. Additionally, there was a difference in bird density between locations (P < 0.0001) and a difference in the proportion of head gates used among locations (P < 0.0001).

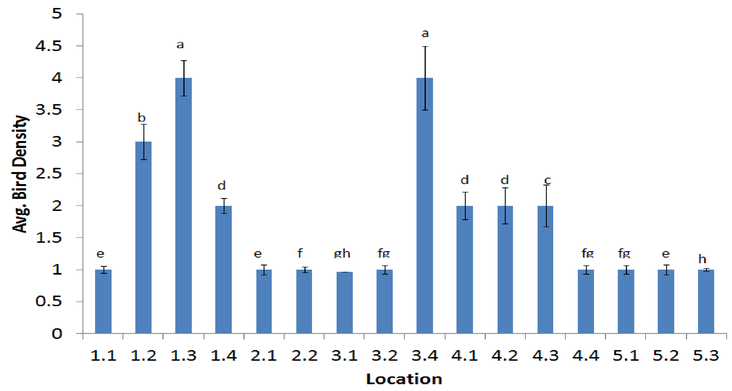
Introduction

- During fall and winter, the presence of starlings on livestock farms increases due to the lack of available resources (Linz et al., 2007)
- Fecal matter contaminates feed ingested by livestock and increases the risk of disease transmission (Duffy and Schaffner, 2002)
- Wild birds compete with cattle at the feed bunk, based on informal observations by farmers and researchers
- Decreasing feed bunk space increases aggression in cattle and decreases feeding behaviors (DeVries et al., 2004).
- Dairies lose an estimated 2.8% - 4.9% of feed from bird consumption (Shwiff et al., 2012).
- Wild birds decrease components of cattle feed, specifically energy-rich components such as starch (Depenbusch et al., 2011; Allen et al., 2012)

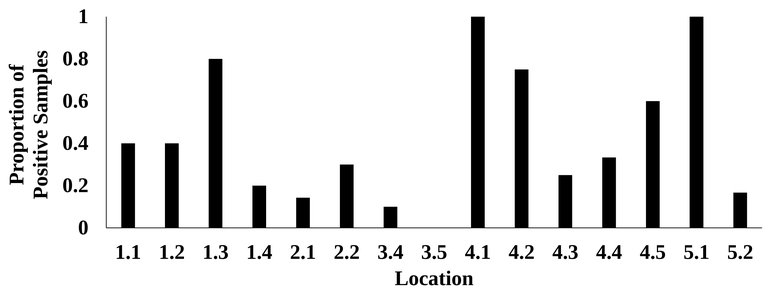
Methods

- Total bird counts were recorded at eleven Washington dairy farms. Each farm was visited once a week (morning and evening) for four weeks.
- Bird fecal samples were collected at the feed bunks of 14 pens and from 1 commodity shed, and analyzed for *E. coli*, *Campylobacter*, and *Salmonella*.
- Fresh and bird-depleted feed samples were collected at the feed bunks and analyzed for dry matter, total digestible nutrients (TDN), protein, crude fiber, ash, fat, and net energy.
- Inter-specific and Intra-specific aggressive and aversive behavioral interactions, bird density, and the proportion of head gates used were observed for 16 pens using Brinno® and DeLaval on-farm cameras.
- Pearson correlations were used to detect relationships among total bird counts, environmental temperature, week, and starling counts.
- Mixed Model ANOVA determined the effects of time of day, roost sighting, week, and environmental temperatures on total bird and starling counts.
- Linear regressions were used to determine the relationship between nutrient loss and bird density for each location.
- Log linear models were used to determine differences in the number and quantity of *E. coli* between locations.

Results



Average bird density among pens. Bird density (birds/m²) differed among locations (P < 0.0001)**.** Locations with different letters are significantly different from one another (P < 0.05).



Proportion of *E. coli* among locations. The proportion of *E.coli* positive samples did not differ among locations (P = 0.14).

Results

Location	Fresh Net Energy Lactation (Mcal/kg)	Bird Net Energy Lactation (Mcal/kg)	Fresh % Fat	Bird % Fat	Fresh % Protein	Bird % Protein
1.2	0.816	0.816	2.76	1.87	9.31	8.18
1.3	0.992	0.683	1.96	1.61	10.55	7.21
4.1	1.04	0.904	1.55	1.43	10.02	8.32
4.3	1.04	1.01	1.55	1.45	10.02	10.31
4.5	0.772	0.816	1.43	1.21	8.82	8.55
5.1	0.551	0.595	0.76	0.88	5.01	5.37
5.2	0.507	0.639	1.21	0.76	3.86	4.40

Change in nutritional components in cattle feed. 'Fresh' indicates fresh feed at delivery time and 'Bird' indicates feed that birds depredated for 30 min. No difference was detected among locations (P > 0.05).

Conclusion/Future Plans

- Wild birds can transmit bacteria such as *E. coli* and *Campylobacter jejuni*, though there was no difference in transmission rates between locations.
- There was a difference in bird density between locations, suggesting that birds have preferences on feeding locations on farms.
- There was no difference in the amount of nutrients loss between locations.
- Wild bird presence on farms are influenced by the presence of roost sites, the week, and the time of day.
- Understanding where birds prefer to feed on dairies, will help create more precise and effective deterrence methods.

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