

Acute Restrictive Effect Associated With Working On Large California Dairies

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RATIONALE

Dairy work has been associated with decreased lung function in Europe and the Midwestern and Eastern US. However, California dairies are unique in being open-air and having substantially larger herd sizes. The purpose of our study is to characterize the occupational exposure of California dairy workers and determine if workplace exposures pose a respiratory health risk.

METHODS

We hypothesize that dairy work on large California dairies is associated with lower baseline lung function as well as an acute decline in lung function over the work shift. This cross-sectional study of 210 male dairy workers and 47 male control (vegetable processing plant) employees conducted in the summer of 2008 included questionnaires and spirometry pre- and post-work shift. Mixed effects models were used to assess the association between dairy work and lung function values.

RESULTS

The average age was 34 (SD=11.0) and 35 years (SD=12.2) for dairy and control participants, respectively. Most were of Mexican or Central American origin, with 94% of dairy and 98% of control workers self-identifying as Hispanic. 27% of dairy workers and 13% of control facility employees were current smokers ($p<0.05$), with an average of 4.7 (SD=4.4) and 3.6 (SD=5.1) cigarettes per day for dairy and control workers, respectively. Baseline lung function values were generally lower among dairy workers, but the results were only marginally significant for FEV₆ ($p=0.08$). There was no significant association of dairy work with other standard measures of lung flow or volume.

Dairy workers experienced a significantly greater cross-shift decrement in FEV₁, FEV₆, and FVC compared to control workers after adjusting for smoking status, but cross-shift decline was not associated with FEF_{25-75%}, FEV₁/FEV₆ or FEV₁/FVC (Table 1).

CONCLUSION

The significant dairy vs. control worker adjusted difference in mean cross-shift declines in FEV₁ ($p<0.05$) suggests a possible association of exposure with airway obstruction, but this is not supported by the results for FEF_{25-75%}, FEV₁/FVC or FEV₁/FEV₆. Significant cross-shift decrement in FEV₆ and FVC ($p<0.01$) suggests an acute restrictive effect among dairy workers. Since baseline values are only marginally associated with dairy work, this appears to be a reversible restrictive effect. Future analyses will include examining tasks around a dairy to see if any specific job or exposure is associated with lung function decrement.

Table 1: Cross work-shift change in PFT measures adjusted for current smoking status

*p-value for dairy vs. control comparison in mean cross-shift changes, adjusted for smoking status

		Dairy		Control		
	n	Estimate	95% CI	Estimate	95% CI	p-value
ΔFEV ₁	253	-48	-74 to -23	16	-35 to 67	0.02
ΔFEV ₆	251	-57	-85 to -28	34	-24 to 91	0.003
ΔFVC	253	-42	-73 to -11	56	-6 to 119	0.003
ΔFEV ₁ /FEV ₆	248	0	-1 to 0	0	-1 to 0	0.76
ΔFEV ₁ /FVC	250	0	-1 to 0	-1	-1 to 0	0.50
ΔFEF _{25-75%}	248	-74	-149 to 2	-14	-164 to 135	0.46

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