

**Supplemental Table 1. Questions from the Agricultural Lung Health Study Early-life Questionnaire Analyzed for Association with Pulmonary Function**

Question	Possible Responses
Did your mother live on a farm while she was pregnant with you?	Yes, No, Don't Know
Did your mother perform any farm activities while she was pregnant with you?	Yes, No, Don't Know
Did your mother work with or around farm animals such as cattle, horses, hogs, poultry, sheep or goats while pregnant with you?	Yes, No, Don't Know
Was your family living on a farm when you were born, regardless of whether they were doing farm work?	Yes, No, Don't Know
At any time before you were age 3, did you spend time around farm animals, such as cattle, horses, hogs, poultry, sheep or goats at least weekly, or for months at a time?	Yes, No, Don't Know
At any time between age 3 and your 6th birthday, did you spend time around farm animals at least weekly or for months at a time?	Yes, No, Don't Know
Were you ever breastfed as an infant?	Yes, No, Don't Know
When you were a child, what was the main type of milk served in your home?	Raw Milk, Pasteurized/Store Bought Milk, No Milk was Served at Home, Don't Know
Have you ever drank raw milk?	Yes, No, Don't Know
If yes, how old were you when you first drank raw milk? If you are not sure of your answer, please provide your best guess	Less Than One Year, 1 Year Old, 2 Years Old, 3 Years Old, 4 Years Old, 5 Years Old, 6 or Older
How old were you when you last drank raw milk? If less than one year old, write "00". If you still drink raw milk, write your current age. If you are not sure, please provide your best guess.	Open Response
At any time before you were age 6, did you have any dogs, cats, other furry pets such as hamsters, or birds living inside your home?	Yes, No, Don't Know
Did your mother smoke cigarettes when she was pregnant with you?	Yes, No, Don't Know
At any time before you were age 6, did anyone living in your home smoke cigarettes?	Yes, No, Don't Know
If Yes, at any time before you were age 6, did your mother smoke cigarettes?	Yes, No, Don't Know
At any time before you were age 6, did your father smoke cigarettes?	Yes, No, Don't Know

**Supplemental Table 2. Demographics of Participants  
in the Agricultural Lung Health Study, 2009-2013**

<b>Characteristic</b>	<b>N (%)</b>
Sex	
Female	1509 (49.3)
Male	1552 (50.7)
Enrollment Status	
Farmer	1603 (52.4)
Spouse	1458 (47.6)
State	
Iowa	2173 (71.0)
North Carolina	888 (29.0)
Race	
White	3011 (98.4)
Non-white	50 (1.6)
Current Asthma Status	
Case	1125 (36.8)
Non-case	1936 (63.3)
Smoking Status	
Never	2036 (66.5)
Former	894 (29.2)
Current	131 (4.3)
Age	
Mean (SD)	63.0 (11.0)
Pack-years	
Mean (SD)	5.9 (14.7)

**Supplemental Table 3. Sensitivity Analyses for Associations between Raw Milk Exposure and Pulmonary Function in the Agricultural Lung Health Study**

Analysis	N	FEV <sub>1</sub>		FVC	
		β (95%CI)	P-value	β (95%CI)	P-value
<b>Adjusted for Recent Raw Milk Consumption<sup>a</sup></b>					
<b>Ever Raw Milk</b>					
No	643	Referent		Referent	
Yes	2212	50.9 (3.3, 98.4)	0.04	65.3 (11.4, 119.2)	0.02
Missing	172				
<b>Excluding 197 Raw Milk Drinkers Whose Consumption May Have Started After Age 18<sup>b</sup></b>					
<b>Ever Raw Milk</b>					
No	643	Referent		Referent	
Yes	2049	49.4 (1.6, 97.3)	0.04	67.6 (13.6, 121.6)	0.01
Missing	172				
<b>Duration of Raw Milk Consumption Among Those Who Started Drinking Raw Milk Before Age 6<sup>c</sup></b>					
Difference in FEV <sub>1</sub> or FVC (ml) per year	1888	-0.18 (-1.61, 1.26)	0.81	0.79 (-0.83, 2.41)	0.34
<b>Excluding 360 Individuals with a FVC quality attribute of "C"<sup>d</sup></b>					
<b>Ever Raw Milk</b>					
No	595	Referent		Referent	
Yes	1953	48.3 (0.3, 96.2)	0.05	62.3 (8.0, 116.6)	0.02
Missing	153				

<sup>a</sup>Estimates adjusted for age, age<sup>2</sup>, gender, race, state, height, height<sup>2</sup>, smoking status, pack-years, asthma status, and recent raw milk consumption (yes or no drink raw milk in last 10 years). FVC estimates also adjusted for weight. Estimates represent the difference in mean response (FEV<sub>1</sub> and FVC in milliliters) between a subject who drank raw milk and one who did not, holding all covariates constant. 168 raw milk drinkers drank raw milk within the last 10 years. 34 raw milk drinkers have missing information regarding timing of last consumption.

<sup>b</sup>Estimates adjusted for age, age<sup>2</sup>, gender, race, state, height, height<sup>2</sup>, smoking status, pack-years, asthma status. FVC estimates also adjusted for weight. Estimates represent the difference in mean response (FEV<sub>1</sub> and FVC in milliliters) between a subject who drank raw milk and one who did not, holding all covariates constant. The 197 excluded individuals did not start drinking raw milk before age 6 or did not stop before age 18 and thus we could not confirm that raw milk consumption started in childhood (i.e. prior to age 18).

<sup>c</sup>Estimates adjusted for age, age<sup>2</sup>, gender, race, state, height, height<sup>2</sup>, smoking status, pack-years, asthma status. FVC estimates also adjusted for weight. Estimates represent the difference in mean response (FEV<sub>1</sub> and FVC in milliliters) for each year increase in drinking raw milk, holding all covariates constant.

<sup>d</sup>Estimates adjusted for age, age<sup>2</sup>, gender, race, state, height, height<sup>2</sup>, smoking status, pack-years, asthma status. FVC estimates also adjusted for weight. Estimates represent the difference in mean response (FEV<sub>1</sub> and FVC in milliliters) between a subject who drank raw milk and one who did not, holding all covariates constant. 360 individuals whose FVC values had a quality attribute of "C" were excluded, leaving 2,701 individuals whose FVC values had a quality attribute of "A" or "B".

**Supplemental Table 4. Associations between Raw Milk Exposures and Pulmonary Function Stratified by Gender, Asthma Status, Atopy Status, and Number of Siblings in the Agricultural Lung Health Study**

Early-life Exposures	N	FEV <sub>1</sub>		FVC	
		$\beta$ (95%CI) <sup>1</sup>	P <sub>Interaction</sub> <sup>2</sup>	$\beta$ (95%CI) <sup>1</sup>	P <sub>Interaction</sub> <sup>2</sup>
<b>Females</b>					
Raw Milk					
No	401	Referent		Referent	
Yes	993	58.0 (9.9, 106.0) <sup>a</sup>		68.1 (14.4, 121.8) <sup>a</sup>	
Missing	115				
<b>Males</b>					
Raw Milk					
No	242	Referent	0.05 <sup>b</sup>	Referent	0.19 <sup>b</sup>
Yes	1253	36.5 (-48.4, 121.3) <sup>a</sup>		56.4 (-40.4, 153.3) <sup>a</sup>	
Missing	57				
<b>Non-Asthmatic</b>					
Raw Milk					
No	412	Referent		Referent	
Yes	1420	61.0 (4.9, 117.1) <sup>c</sup>		66.2 (0.9, 131.5) <sup>c</sup>	
Missing	104				
<b>Asthmatic</b>					
Raw Milk					
No	231	Referent	0.07 <sup>d</sup>	Referent	0.30 <sup>d</sup>
Yes	826	23.1 (-59.3, 105.5) <sup>c</sup>		53.2 (-36.7, 143.0) <sup>c</sup>	
Missing	68				
<b>Non-Atopic</b>					
Raw Milk					
No	489	Referent		Referent	
Yes	1802	50.7 (-2.6, 104.0) <sup>e</sup>		56.1 (-3.9, 116.2) <sup>e</sup>	
Missing	124				
<b>Atopic</b>					
Raw Milk					
No	130	Referent	0.62 <sup>f</sup>	Referent	0.32 <sup>f</sup>
Yes	388	47.6 (-59.4, 154.6) <sup>e</sup>		108.1 (-14.1, 230.3) <sup>e</sup>	
Missing	40				
<b>0-2 Siblings</b>					
Raw Milk					
No	430	Referent		Referent	
Yes	1284	34.9 (-23.8, 93.5) <sup>g</sup>		39.1 (-27.4, 105.5) <sup>g</sup>	
Missing	103		0.40 <sup>h</sup>		0.28 <sup>h</sup>
<b>3+ Siblings</b>					
Raw Milk					
No	212	Referent		Referent	
Yes	960	78.1 (-0.6, 156.7) <sup>g</sup>		111.2 (21.9, 200.6) <sup>g</sup>	
Missing	69				

<sup>a</sup>Estimates adjusted for age, age<sup>2</sup>, race, state, height, height<sup>2</sup>, smoking status, pack-years, asthma status (and weight for FVC). Estimates represent the difference in mean response (FEV<sub>1</sub> and FVC in milliliters) between a subject who experienced the exposure and one who did not, holding all covariates constant.

<sup>b</sup>FEV<sub>1</sub> and FVC (in milliliters) regressed on raw milk, gender, raw milk\*gender, age, age<sup>2</sup>, race, state, height, height<sup>2</sup>, smoking status, pack-years, asthma status (and weight for FVC). P-value for the interaction term raw milk\*gender.

<sup>c</sup>Estimates adjusted for age, age<sup>2</sup>, gender, race, state, height, height<sup>2</sup>, smoking status, pack-years (and weight for FVC). Estimates represent the difference in mean response (FEV<sub>1</sub> and FVC in milliliters) between a subject who experienced the exposure and one who did not, holding all covariates constant.

<sup>d</sup>FEV<sub>1</sub> and FVC (in milliliters) regressed on raw milk, asthma status, raw milk\*asthma status, age, age<sup>2</sup>, gender, race, state, height, height<sup>2</sup>, smoking status, pack-years (and weight for FVC). P-value for the interaction term raw milk\*asthma status.

<sup>e</sup>Estimates adjusted for age, age<sup>2</sup>, gender, race, state, height, height<sup>2</sup>, smoking status, pack-years, asthma status (and weight for FVC). Estimates represent the difference in mean response (FEV<sub>1</sub> and FVC in milliliters) between a subject who experienced the exposure and one who did not, holding all covariates constant. 88 individuals were missing atopy status and therefore not included in atopy stratified analysis. Atopic defined as specific IgE > 0.70 IU/ml to at least one of ten

allergens measured in blood: seasonal (Bermuda grass, ragweed, Timothy grass, mountain cedar), perennial (*Alternaria*, dust mite, cat dander), and food (milk, egg, wheat).

<sup>f</sup>FEV<sub>1</sub> and FVC (in milliliters) regressed on raw milk, atopy status, raw milk\*atopy status, age, age<sup>2</sup>, gender, race, state, height, height<sup>2</sup>, smoking status, pack-years, asthma status (and weight for FVC). P-value for the interaction term raw milk\*atopy status.

<sup>g</sup>Estimates adjusted for age, age<sup>2</sup>, gender, race, state, height, height<sup>2</sup>, smoking status, pack-years, asthma status (and weight for FVC). Estimates represent the difference in mean response (FEV<sub>1</sub> and FVC in milliliters) between a subject who experienced the exposure and one who did not, holding all covariates constant. 3 individuals were missing number of siblings and therefore not included in number of siblings stratified analysis. Number of siblings dichotomized as 0-2 siblings or 3+ siblings.

<sup>h</sup>FEV<sub>1</sub> and FVC (in milliliters) regressed on raw milk, number of siblings, raw milk\*number of siblings, age, age<sup>2</sup>, gender, race, state, height, height<sup>2</sup>, smoking status, pack-years, asthma status (and weight for FVC). P-value for the interaction term raw milk\*number of siblings.