

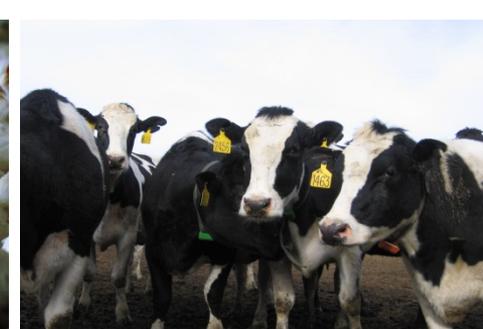
Case Study: Regulatory-Industry Partnership to Address Air Emissions from Dairy Operations in Yakima, WA

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December 4, 2013
Ag Air Quality Task Force
Washington DC

Outline

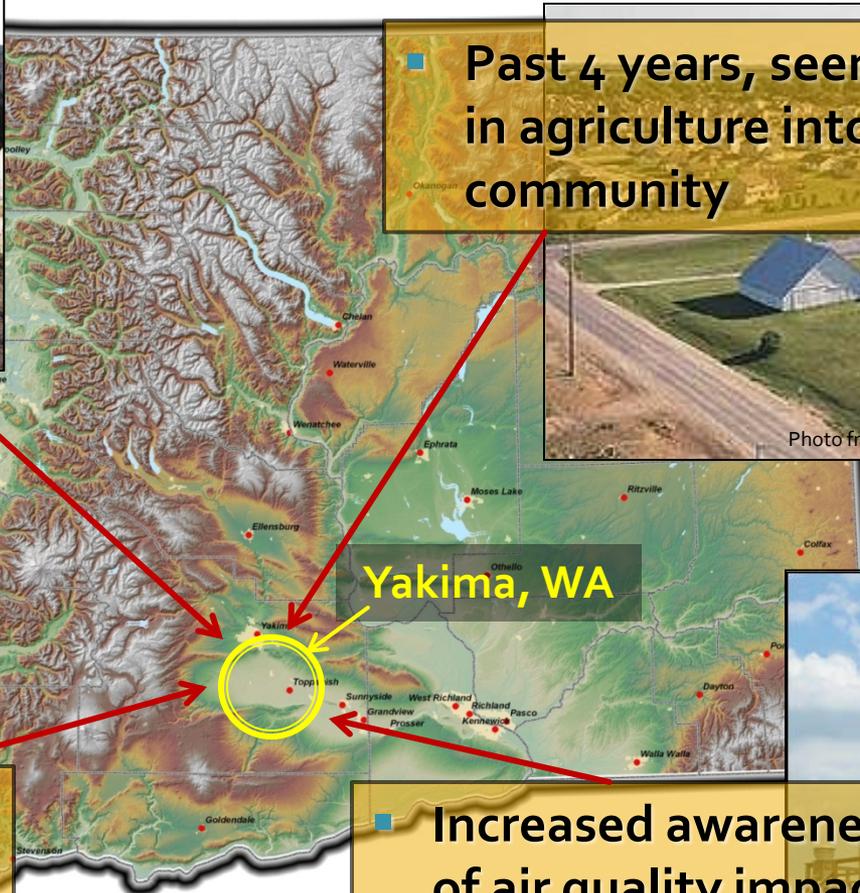
- Yakima, WA – Dairy AQ
 - “Air Quality Management Policy and Best Management Practices for Dairy Farms”
 - Pilot Project
 - Partnerships
 - Next Steps
- Questions / Discussion



Yakima, WA - Background



- 70 Dairies
- 90,000 cows
- 40% ↑ in cow numbers from 2000-2010
- 20% ↑ from 2007-2010



■ Past 4 years, seen an ↑ in agriculture into community



■ Community raised their voice on the issue of ag air quality



■ Increased awareness of air quality impacts and non-attainment

AQMP Policy Proposal - 2010

- Applies to dairies only
- Policy addresses pollutants:
 - NH_3 , N_2O , H_2S , VOC, Odor, PM, CH_4 , NO_x
- Air Quality Management Plan (AQMP)
- Policy outlines BMPs to be evaluated
- BMP selection - Voluntary approach
- Not monitored – “Assumes” results
- *Received a lot of feedback*

Yakima AQ Pilot Project - 2011

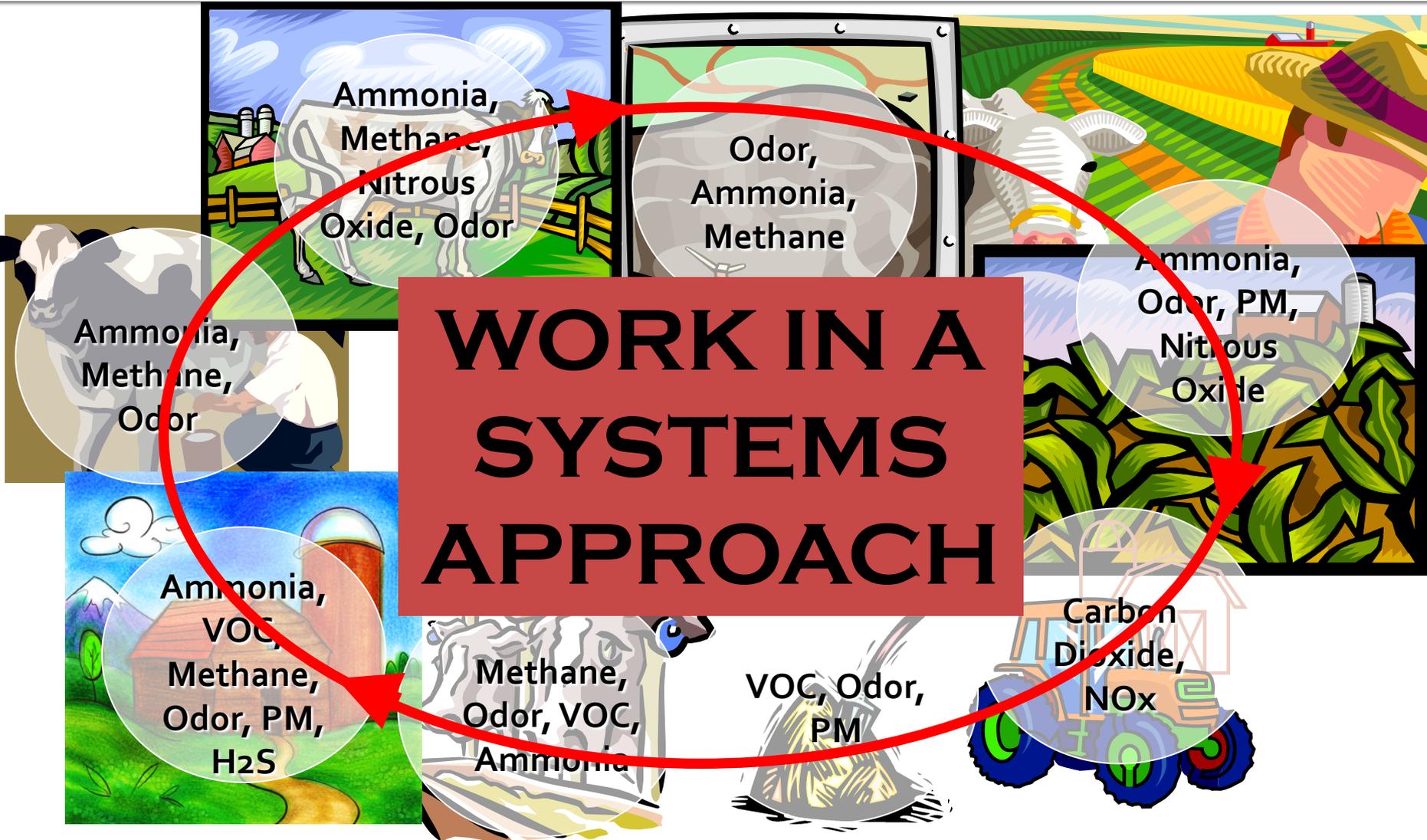
- **February 2011** - Board approved a **Pilot Research Project**
 - *Aimed at gathering information and testing feasibility of implementing and measuring effectiveness of policy*
 - 12 month project developing and testing materials
 - 12 dairies volunteered (67% of cows)
 - Inspections conducted June & October
 - YRCAA contracted with scientists and experts

Pilot Project - Work Products

1. Identify pollutants and areas to address
2. Inspection Protocol
3. BMP Score Sheet
4. BMP Selection Guide
5. BMP Tiered Selection Matrix
6. Air Quality Management Plan



1. Pollutants to Address



2. Inspection Protocol

- Seasonal evaluation
- Evaluate entire operation & talk with producer
- Look at BMPs on list, and ones that are not
- Score each BMP for each area on farm
- Enter scores into [Score Sheet](#)



3. BMP Score Sheet

- AQ BMP evaluation tool (*different than NAQSAT*)
- Subjective, observational assessment
- Requires knowledge of AQ BMPs
- BMPs and weighting values based on scientific data
- Gives idea of areas in need of improvement, **not a regulatory value**

AQ BMP Score Sheet

BMPMultipleScore_071411(v7).xlsx - Microsoft Excel

Producer/Dairy Name:																Date:			
AO BMP SCORE SHEET																			
BMP #	BMP Scores								Best Management Practice	Ammonia (NH ₃)	Nitrous Oxide (N ₂ O)	Hydrogen Sulfide (H ₂ S)	Volatile Organic Compounds (VOCs)	Odor	Particulate Matter (PM)	Methane (CH ₄)	Oxides of Nitrogen (NO _x)		
	NH ₄	N ₂ O	H ₂ S	VOC	Odor	PM	CH ₄	NO _x											
I. Nutrition																			
I. 1	5	5	0	0	2	0	0	0	properly manage level of dietary protein (~16%CP)										
I. 2	0	0	0	2	0	0	5	0	feed increased level or quality of starch in diet (23-26%)										
I. 3	0	0	5	0	2	0	0	0	manage and minimize overfeeding of sulfur-containing feed (0.2-0.4%)										
I. 4	5	5	5	0	5	0	2	0	practice group and/or stage of lactation feeding										
	10	10	10	2	9	0	7	0	<i>Weighted Subtotal</i>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
									%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	NA	#DIV/0!	NA		
II. Feed Management																			
II. 1	2	0	0	5	4	3	0	0	Properly manage ensiled feedstuffs										
II. 2	0	0	0	3	3	4	0	0	Store feed in a sheltered storage structure										
II. 3	1	0	0	3	3	4	0	0	Regularly remove spilled and unused feed from feeding area										
II. 4	0	0	0	0	0	5	0	0	Manage or minimize feed mixing during windy times										
	3	0	0	11	10	16	0	0	<i>Weighted Subtotal</i>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
									%	#DIV/0!	NA	NA	#DIV/0!	#DIV/0!	#DIV/0!	NA	NA		
III. Milk Parlor																			
III. 1	3	0	0	0	0	0	0	0	Ensure proper ventilation										
III. 2/3	5	0	4	4	5	0	0	0	Use recycled (clean) or treated water for flushing parlor										
III. 2/3	5	0	4	4	5	0	0	0	Use recycled (clean) or treated water for cleaning holding pen										
III. 4	5	0	0	5	5	0	0	0	Remove manure from holding area frequently										
	18	0	8	13	15	0	0	0	<i>Weighted Subtotal</i>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
									%	#DIV/0!	NA	#DIV/0!	#DIV/0!	#DIV/0!	NA	NA	NA		
IV. Housing - Freestall Barns																			
IV. 1	3	0	0	0	0	0	0	0	Ensure proper ventilation										

AQ BMP Score Sheet

1 Producer/Dairy Name: _____ Date: _____ (Version 9; 11/27/13)

AQ BMP SCORE SHEET

BMP #	BMP Scores								Best Management Practice	Overall Assessment Score	Ammonia (NH ₃)	Nitrous Oxide (N ₂ O)	Hydrogen Sulfide (H ₂ S)	Volatile Organic Compounds (VOCs)	Odor	Particulate Matter (PM)	Methane (CH ₄)	Oxides of Nitrogen (NO _x)
	NH ₃	N ₂ O	H ₂ S	VOC	Odor	PM	CH ₄	NO _x										
58	VII. 3	5	0	5	5	5	0	4	0	Scrub exhaust of enclosed waste containers	5	5	5	4	5		5	
59	VII. 4	0	0	0	5	4	0	5	0	Proper maintenance of installed methane digester	NA							
60	VII. 5	3	0	3	3	5	0	0	0	Surface aeration of lagoons	NA							
61	VII. 6	5	0	3	0	2	0	0	0	Reduce the pH of lagoons and manure piles below 6	NA							
62	VII. 7	3	0	5	0	5	0	0	0	Purple sulfur bacterial formation in lagoons	NA							
63	VII. 8	5	0	5	0	5	4	0	0	Properly manage the composting of manure	4	3	5	4	4			
64	VII. 9	5	0	4	0	4	4	3	0	Properly manage stockpiled manure	3	3	3	3	2	3		
65		35	0	34	18	39	8	19	0	Weighted Subtotal	19.6	0.0	20.6	4.0	19.6	4.8	11.4	0.0
66										%	82	NA	90	80	85	60	88	NA
VIII. Land Application - Manure or Chemical Fertilizer																		
68	VIII. 1	4	3	2	0	3	3	0	0	Apply N fertilizer below no-till residue	3	3	4	4	4	4		
69	VIII. 2(a)	5	5	5	5	5	3	3	0	Corn - Inject fertilizer/manure into soil at application	5	5	4	4	4	5	4	5
70	VIII. 2(b)	5	5	5	5	5	3	3	0	Forage - Manure/fertilizer application method and/or incorporation practice	3	2	3	3	3	2	4	4
71	VIII. 3	5	5	0	0	3	0	0	0	Apply nutrients according to agronomic recommendations based on soil and manure test results	4	3	5		4			
72	VIII. 4	4	4	0	0	0	0	0	0	Do not over-irrigate	5	5	5					
73	VIII. 5	3	3	0	0	0	4	0	0	Utilize cover crops in winter crop rotation	2	3	3			2		
74	VIII. 6	5	0	3	4	4	5	0	0	Apply during cool weather and on still rather than windy days	4	3	4	4	3	4		
75		31	25	15	14	20	18	6	0	Weighted Subtotal	21.2	20.2	11.0	10.2	14.2	12.8	5.4	0.0
76										%	68	81	73	73	71	71	90	NA
IX. Other																		
78	IX. 1	3	0	3	0	3	5	0	0	Installation of windbreaks or shelterbelts	NA							
79	IX. 2	0	0	0	0	0	4	0	0	Vehicle road condition management	NA							
80	IX. 3	0	0	0	0	0	0	0	5	Engine selection and efficiency	NA							
81		3	0	3	0	3	9	0	5	Weighted Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82										%	0	0	0	0	0	0	0	0
83		171	56	83	79	170	85	38	5	Weighted Total:	52.4	30.2	39.6	19.6	47.2	2.8	18.8	0.0
84										Total Possible:	67	35	48	27	59	33	21	0
85										Total Percent (%) by Pollutant:	78	86	83	73	80	66	90	-

Overall Score (%) / Grade	
79	B
Range	Grade
90-100%	A
80-90%	B
70-80%	C
60-70%	D
<60%	E

4. BMP Selection Guide

- Guide to dairy BMPs
 - Nutrition
 - Feed Management
 - Milk Parlor
 - Housing – Freestall
 - Housing – Drylot
 - Grazing
 - Manure Management
 - Land Application
 - Other

DESCRIPTIONS OF BEST MANAGEMENT PRACTICES (BMPs) FOR AIR EMISSION REDUCTION ON DAIRY OPERATIONS

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Produced for the Yakima Regional Clean Air Agency,
June 2011

The purpose of this document is to present brief descriptions of available best management practices (BMPs) for controlling air emissions from dairy operations. The descriptions are presented in a system-specific manner which includes Nutrition, Feed Management, Housing (Freestall Barns), Housing (Drylot Pens), Grazing, Manure Management, and Land Application (Fertilizer and Manure). Not all components or BMPs presented here may apply to your farm. Pollutants impacted by each BMP are presented in parenthesis. These descriptions are not intended to provide detailed information as to how the BMPs should be implemented. It is expected that exact implementation will vary from farm to farm. When applicable, tradeoffs, limitations, or both are listed for each BMP.

Definitions: NH_3 – ammonia; N_2O – nitrous oxide; H_2S – hydrogen sulfide; CH_4 – methane; VOC – volatile organic compounds; PM – particulate matter.

I. Nutrition

1. Properly Manage Level of Dietary Protein (%CP) in Diet to Match, Rather Than Exceed, an Animal's Needs (NH_3 , N_2O , Odor)

The most effective and practical way of reducing NH_3 emissions is through proper feeding of dietary nitrogen (N). In the diet, the primary source of N is protein. Excess dietary nitrogen is excreted in the urine as urea, which reacts with the fecal enzyme urease and volatilizes as NH_3 . In general, available research data has demonstrated that properly managed feeding of dietary protein N will result in an NH_3 reduction. Studies show that the maximum nitrogen retention efficiency in cows is approximately 50% (1), with the typical efficiency at 38%, so small changes can have a big effect. For example, reducing the protein in the diet from 19 to 14% has shown to reduce urinary urea excretion and subsequent NH_3 emission by 33% (2), with no reduction in milk production. The recommended level of CP in the diet is approximately 16%, with considerations made for MUN and herd efficiency factors.

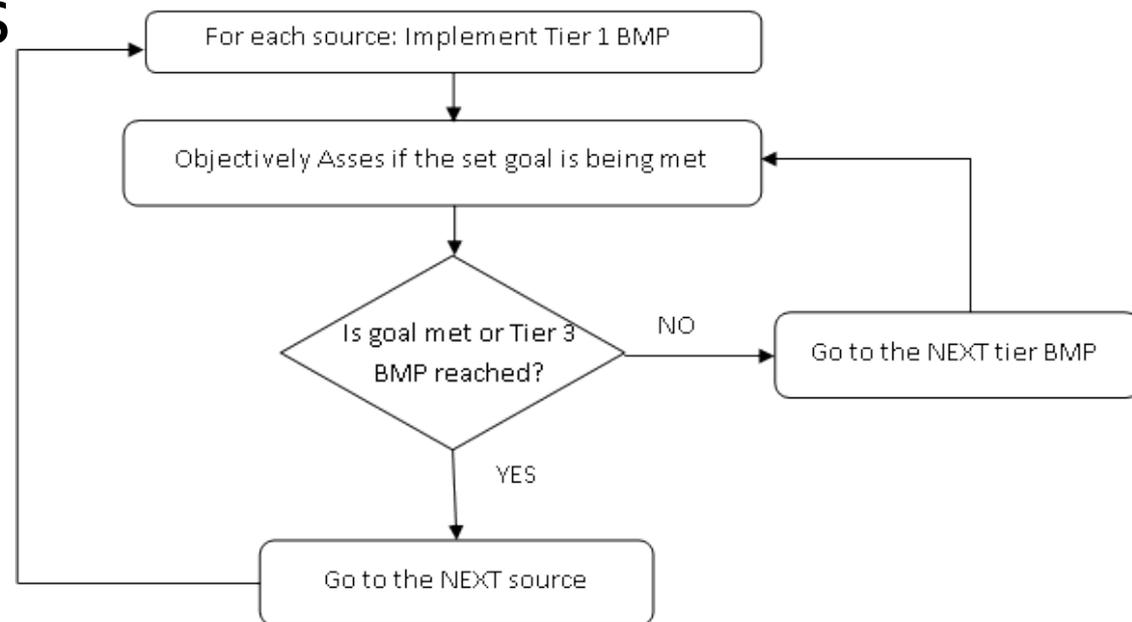
Added advantages of ensuring proper levels of protein in the diet, in addition to reducing NH_3 emissions, include: 1) reduced operating costs considering protein is the most expensive component of the feeds, 2) healthier animals, and 3) improved nitrogen to phosphorus (N:P) ratio for crops when manure is applied to crop land.

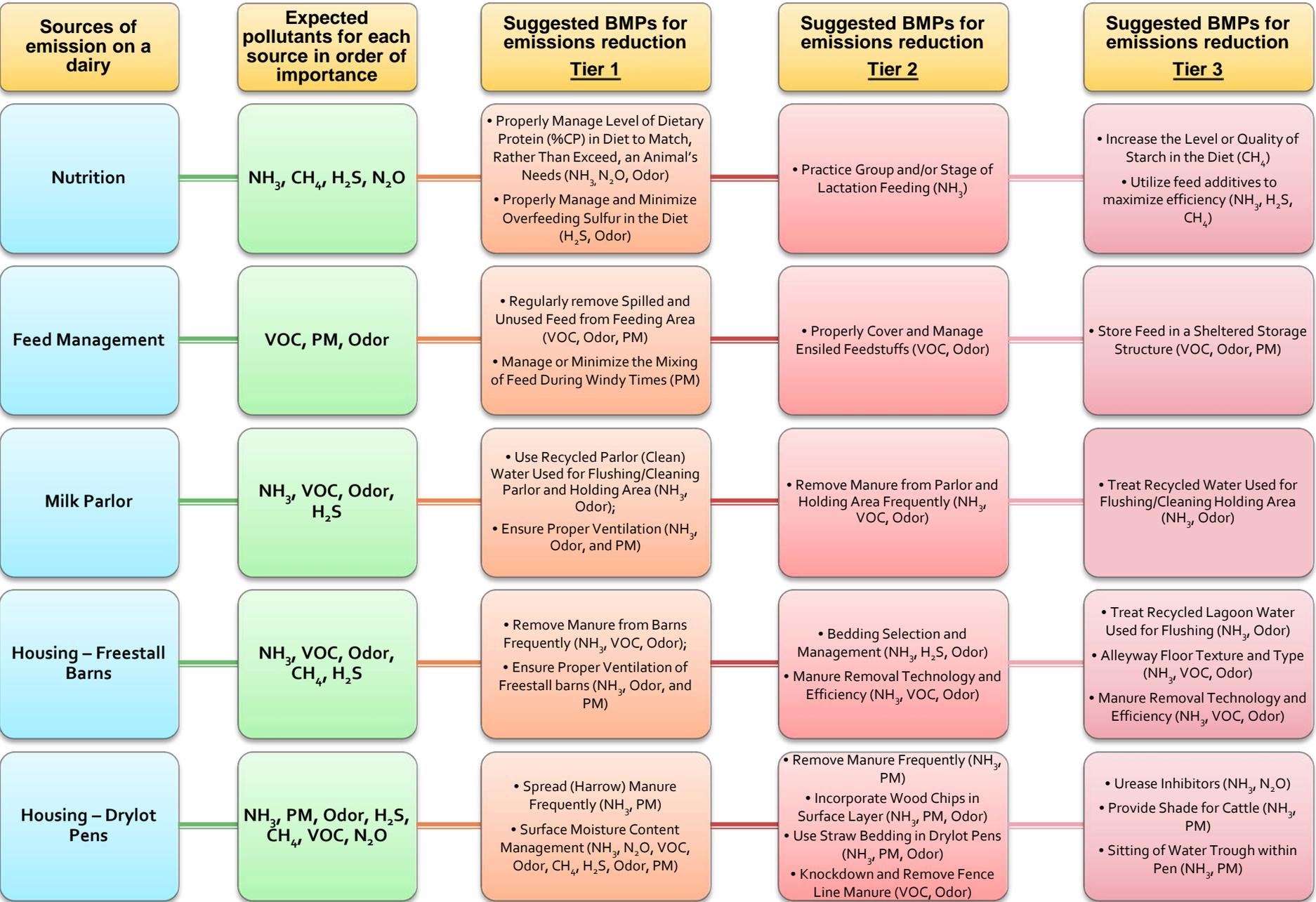
2. Increase the Level or Quality of Starch in the Diet (CH_4)

Increasing the level of starch or rapidly fermentable carbohydrates in the diet impacts the

5. BMP Selection Matrix

- Based on a tiered approach
- Increasing level of economic, technical, and time input
- Accommodates a level of good management





6. Air Quality Management Plan

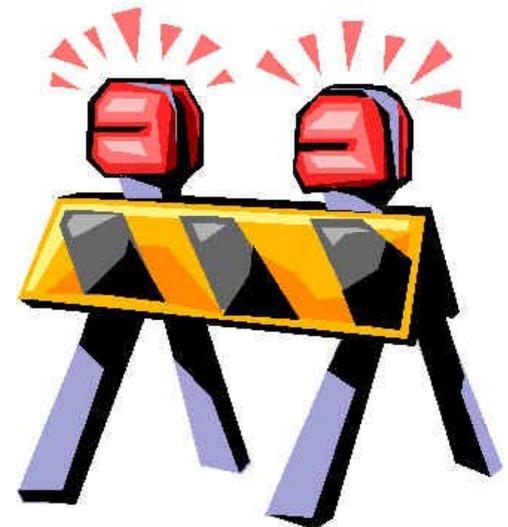
- Develop Air Quality Management Plans (AQMP) for dairies
- Establish AQMP template and content
- Needs:
 - Provide training
 - Certify planners for AQMP development
 - Work with NRCS on EQIP for AQ practices

Yakima AQ Process cont...

- **December, 2011** – Completion of Pilot Project and final report
- **July 2013** – YRCAA adopted policy
- **October 2013** – Dairy AQ Taskforce formed
- **December 2013** – Workshop
- **February 2014** – All dairies must be enrolled in policy
- **Future** – ???

Dairy Reaction

- Wary of more regulation
- Willing to cooperate, proactive leaders
- Don't want confrontation with community
- **Feel singled out**
- Barriers to BMP Adoption:
 - Cost
 - Feasibility
 - Technical knowledge
 - Implementation limitations



Community Reaction

- Can't see the impact of process
- Monitoring component is necessary, but very difficult
- Want to bring human health issue to the table – Challenging
- Need to provide more education to all sides (YRCAA, dairy, community)
- Address the social aspect of the issue
- *Don't feel heard by other sides*

Overall Process

- **Very unique process** - dairy industry proactive and cooperative
- **Creation of AQMPs for dairy operations is new**- will set a precedence
- **Using science and air quality experts** brought defensible, validity to process
- **Unanimity** of process may never happen
- **Process is still being evaluated** - step forward has been taken!

Questions/Discussion

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