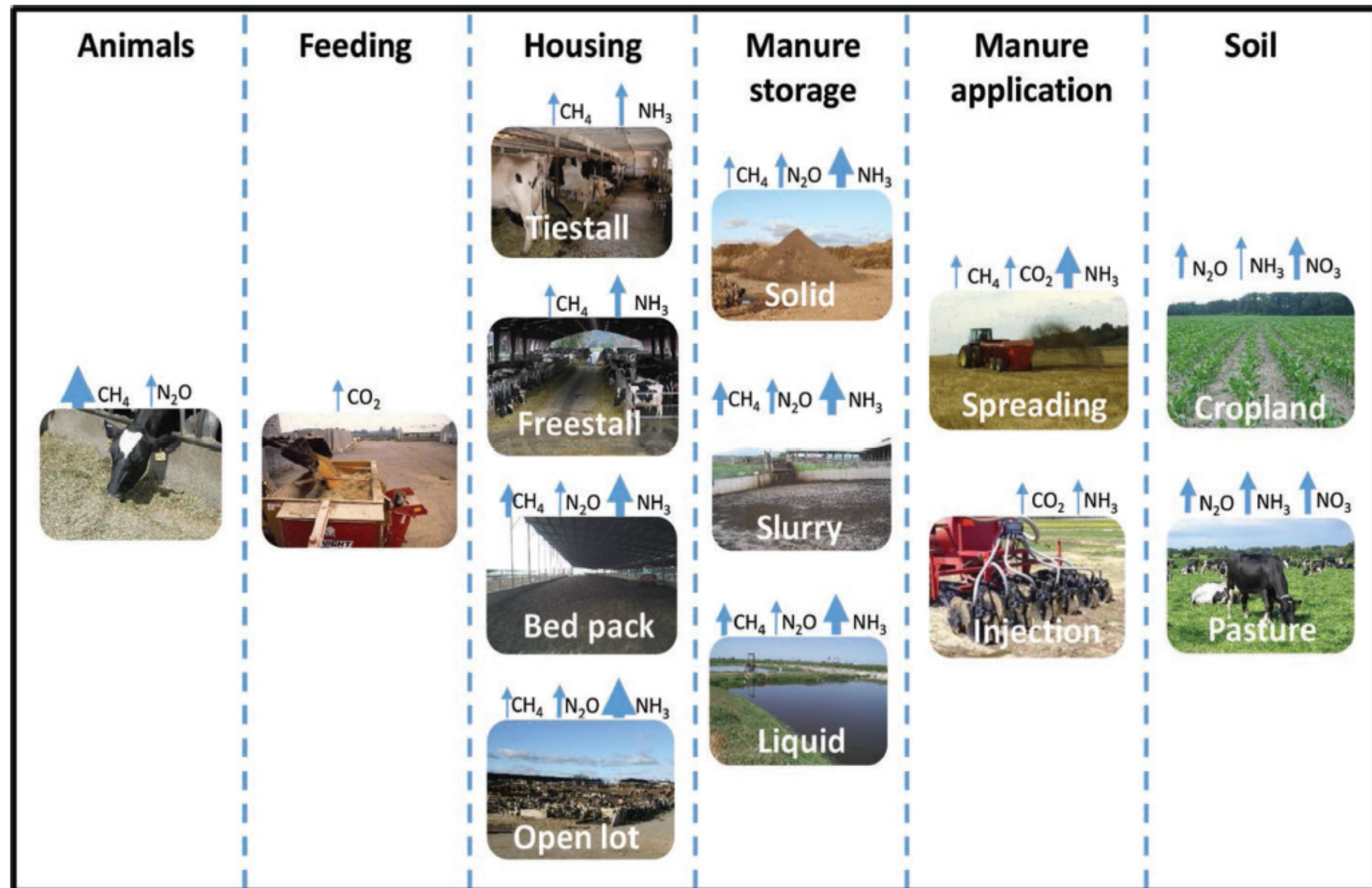


# Economic Sector Overview & Feed, Water, and Utility Price

-- Xinxin (Winnie) Fan, Ph.D., Cornell University,  
Jennie Popp, Ph.D., University of Arkansas



## 2. Emissions from Dairy Farm



Source: Modeling greenhouse gas emissions from dairy farms

<https://www.sciencedirect.com/science/article/pii/S002203021731069X>

# 3. Price for Feed Ingredients

- In total, 124 Feed Items for RuFaS,  
3/4 Items with Price Data Found

- Three Major Data Sources:

## 1) Feedstuffs.com

(e.g., <https://www.feedstuffs.com/ingredient-prices/ingredient-market-prices-11242020>)

### ➤ Frequency:

- Weekly data
- 03/18/2011 to 11/24/2020

Table1: Feedstuffs (30 Items)

Feedstuffs' Item Name	RuFaS Entry ID
bakery feed	4
barley feed	8
beet pulp pellets	11
beet pulp shreds	11
flash dried blood meal	14
brewers dried grains	16
canola meal	19
citrus pulp pellets	21
corn gluten feed	24
corn gluten meal	25
hominy feed	33
whole cottonseed	38
cottonseed hulls	39
cottonseed meal	40
prime tallow	44
hydrolized feather meal	46
menhaden fish meal	49
linseed meal	96
cane molasses	100
rolled oats	101
rice bran	106
safflower meal	108
soybean hulls	114
soybean meal	117
sunflower seed meal	122
bran	126
middlings	129
whey protein concentrate	132
dried skim milk	133
meat and bone meal	44

# 3. Price for Feed Ingredients

## 2) USDA Agricultural Marketing Service (AMS) Report

(e.g., <https://marketnews.usda.gov/mnp/ls-report-config>)

### ➤ Frequency:

- Weekly data
- 01/06/2000 to Current

Table 2: USDA AMS (27 Items)

USDA Item Name	RuFaS Entry ID
ALFALFA MEAL	1
ALMOND HULLS	2
BARLEY	8
BEET PULP	11
CANOLA MEAL	19
CORN DISTILLERS DRIED GRAIN	23
CORN GLUTEN FEED	24
CORN GLUTEN FEED MEAL	25
YELLOW CORN HOMINY FEED	33
COTTONSEED WHOLE	38
COTTONSEED MEAL	40
SOYBEAN OIL	45
FEATHER MEAL	46
FISHMEAL	49
LINDSEED MEAL	96
MEAT MEAL	97
CANE MOLASSES	100
OATS	101
RICE BRAN	106
SOYBEAN HULLS	114
SOYBEAN MEAL HIGH PROTEIN	115
SOYBEAN MEAL LOW PROTEIN	118
SUNFLOWER MEAL	122
WHEAT BRAN	126
WHEAT MIDLINGS	129
MEAT AND BONE MEAL	134
Corn	26

# 3. Price for Feed Ingredients

## 3) Proprietary Source

➤ Frequency:

- Monthly data
- 11/2015 to Current

Table 3: Data Availability (13 Items)

RuFaS Entry ID	RuFaS Feed Name	Proprietary Source -- Feed Name
15	BLOOD	AP 920 BOVINE BLOOD PLASMA
45	FATS AND OILS	SOY OIL
135	Calcium carbonate	CAL CARB MEDIUM
136	Dicalcium Phosphate, dibasic	PHOSPHATE, 18.5% DICALCIUM
137	Calcium Phosphate monobasic	PHOSPHATE, FINE 21% MONOCALCIUM
138	Calcium Sulfate, dihydrate	CALCIUM SULFATE-BAGGED
141	Magnesium Oxide	MANGANOUS OXIDE-BAGGED
142	Potassium Chloride	POTASSIUM CHLORIDE-RED
145	Sodium Bicarbonate	SODIUM BICARBONATE
146	Sodium Phosphate, Monohydrate	PHOSPHATE, XP4 MONO SODIUM
148	Potassium Sulfate	POTASSIUM MAGNESIUM SULFATE
151	Ammonium Chloride	AMMONIUM CHLORIDE
152	Calcium Chloride dihydrate	CALCIUM CHLORIDE

# 4. Price for Water

- Data Source: Irrigation and Water Management Survey (USDA NASS)
  - Expenses for Irrigation Water from Off-Farm Suppliers
  - Four years: 2003, 2008, 2013, 2018

Table 4: Average Cost per Acre-foot by State

state	Average cost per acre-foot 2018	Average cost per acre-foot 2013	Average cost per acre-foot 2008	Average cost per acre-foot 2003	6YearGrowthRate _18to13	AnnualGrowthRate _18to13	6YearGrowthRate _13to08	AnnualGrowthRate _13to08	6YearGrowthRate _08to03	AnnualGrowthRate _08to03	Average_AnnualGrowthRate
Alabama	495.9	407.61	183.77	54.35	0.22	0.04	1.22	0.20	2.38	0.40	0.21
Alaska	165	131.43			0.26	0.04					0.04
Arizona	30.18	29.43	28.76	15.91	0.03	0.00	0.02	0.00	0.81	0.13	0.05
Arkansas	49.62	27.52	4.92	13.11	0.80	0.13	4.59	0.77	-0.62	-0.10	0.27
California	67.97	45.59	48.03	29.56	0.49	0.08	-0.05	-0.01	0.62	0.10	0.06
Colorado	14.19	16.96	14.29	7.28	-0.16	-0.03	0.19	0.03	0.96	0.16	0.05
Connecticut		155.41	125.58	131.23			0.24	0.04	-0.04	-0.01	0.02
Delaware		200									
Florida	124.12	64.72	14.16	9.41	0.92	0.15	3.57	0.60	0.50	0.08	0.28
Georgia	43.59	41.63			0.05	0.01	-1.00	-0.17			-0.08
Hawaii	235.42	151.45	157.75	19.88	0.55	0.09	-0.04	-0.01	6.94	1.16	0.41
Idaho	16.78	17.65	15.13	10.53	-0.05	-0.01	0.17	0.03	0.44	0.07	0.03
Illinois	42.31	115.85			-0.63	-0.11					-0.11
Indiana	150	107.57			0.39	0.07					0.07
Iowa	62.31	78.76	10.67	2.39	-0.21	-0.03	6.38	1.06	3.46	0.58	0.54
Kansas	41.55	47.16	28.58	25.78	-0.12	-0.02	0.65	0.11	0.11	0.02	0.04
Kentucky	2186.57	1258.07	1111.67	238.33	0.74	0.12	0.13	0.02	3.66	0.61	0.25
Louisiana	254.17	70.53	73.01	5.79	2.60	0.43	-0.03	-0.01	11.61	1.93	0.79

# 5. Price for Utility

- Prices for Electricity, Natural Gas, Diesel, Propane
- Data Source: U.S. Energy Information Administration (EIA)

Table 5: EIA Data Summary

<b>Electricity</b>
Units = cents/kWh
Monthly from 01/2001 to 02/2021 by state (all states)
<b>Natural gas</b>
Units = \$/1000 ft3
Monthly data 01/2001 to 02/2021 by state (all states)
<b>Gasoline</b>
Units = \$/gal
Weekly data from 05/2003 to 05/2021 by region (5 regions) and state (9 states)
<b>Diesel</b>
Units = \$/gal
Weekly data from 01/2000 to 05/2021 by region (5 regions)
<b>Propane</b>
Units = \$/gal
Weekly data from 10/2013 to 03/2021 by state (26 states)

<b>5 Regions for Gasoline and Diesel</b>
East Coast
Midwest
Gulf Coast
Rocky Mountain
West Coast



# 6. Next Steps

- Data and Model Alignment
  - For matched years:
    - annual average prices
  - For years without data:
    - the average prices  $\times$  annual grow rate as estimates
- Cost Formulation
  - Feed Prices: ration formulation -- non-linear least cost optimization
    - Update input prices to simulate optimal feed usages
    - Calculate feed cost by ingredient (optimal usage  $\times$  price) and in total
  - Water Expense: water price  $\times$  usage
  - Energy Cost: electricity or diesel price  $\times$  usage

# 7. Discussion

- How to estimate price data for years after 2021?
  - Same as with water
- How to calculate labor cost under different management practices?
  - Production budgets
- How to estimate animal disposal costs and practices?
- What time frame will be used to estimate costs?