Labor and Automation
An exploratory analysis in California and Wisconsin

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7E 75 YEARS · LOUISLAB dairy econ · **UC DAVIS VETERINARY MEDICINE** · **UNIVERSITY OF WISCONSIN RIVER FALLS**

Abstract

The dairy industry relies heavily on manual labor, which constitutes about 12% of the milk production cost. Increasing wages and labor shortages are motivating farmers to look for alternatives such as automation. Our survey–conducted in California and Wisconsin– explores the perception of dairy farmers on labor issues and adoption of automated systems. Our results show that:

(1) There are regional differences in labor sources in the two largest dairy states,
(2) Automatic cluster removers are more commonly used than fully automated systems,
(3) Improved milk yield and labor concerns are drivers to automate, and
(4) Investment cost is a major barrier to adopt robotic milking.

Thus, automation adoption is still in early stages, with a lower adoption rate in California.

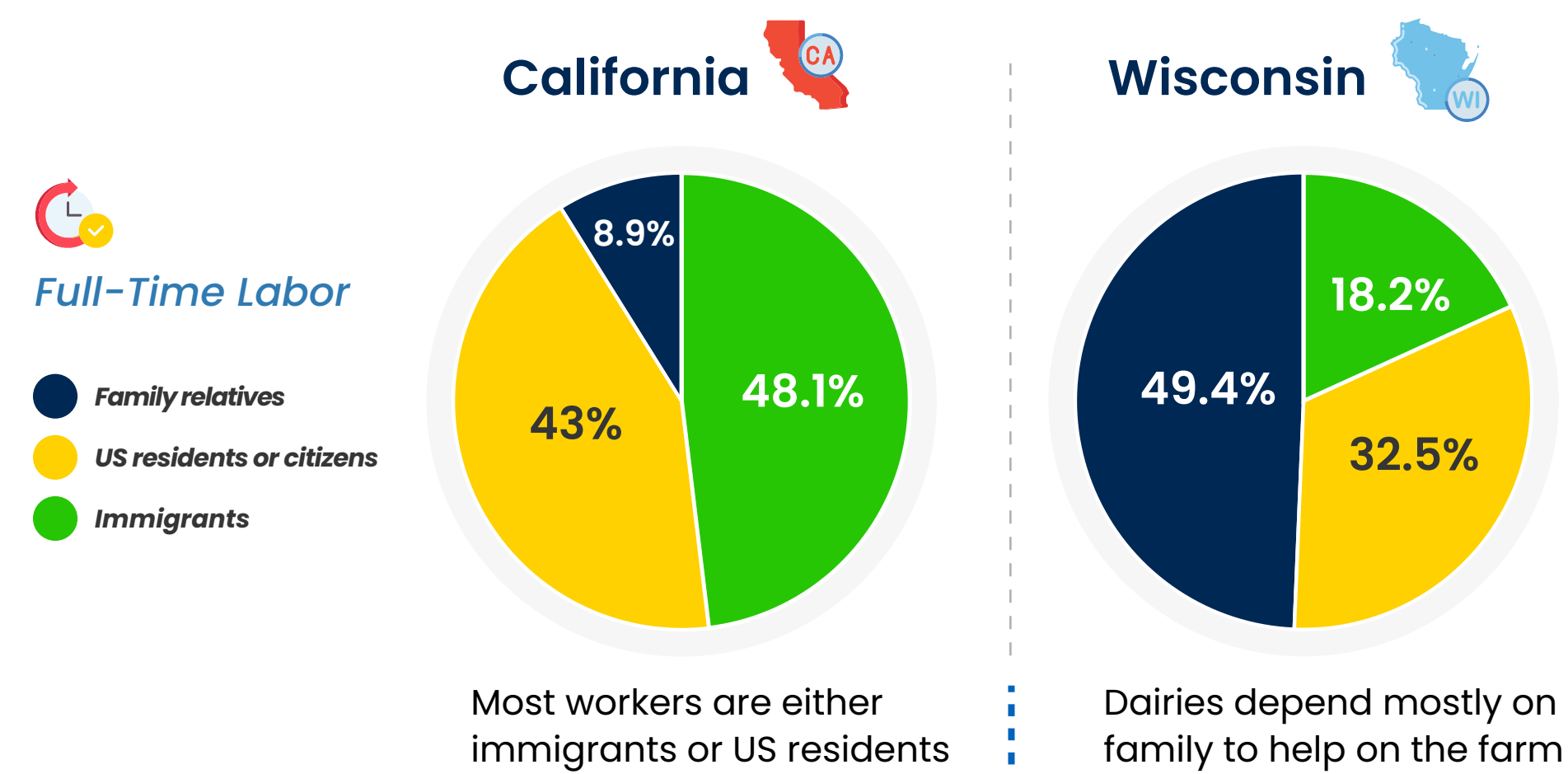## Labor Situation in Dairy Farms
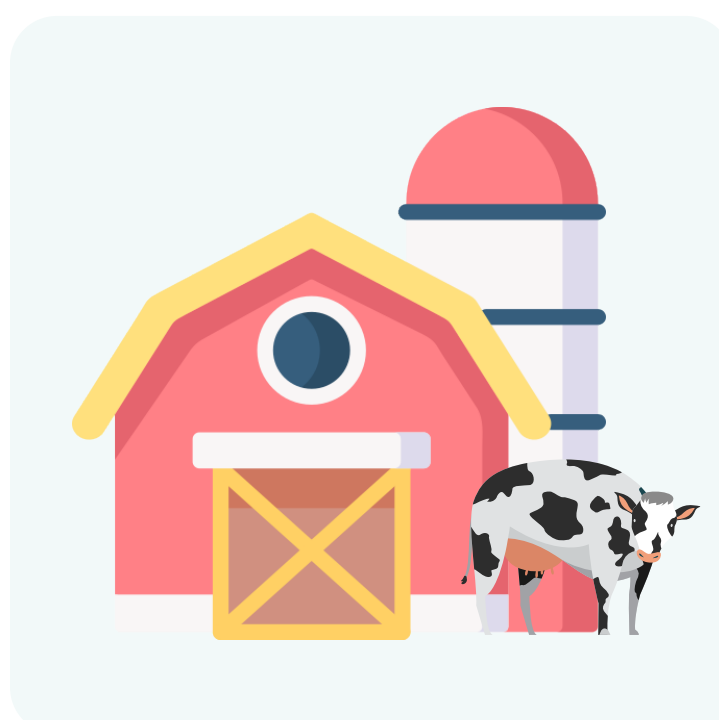
The dairy industry is the largest agricultural sector in California and Wisconsin.

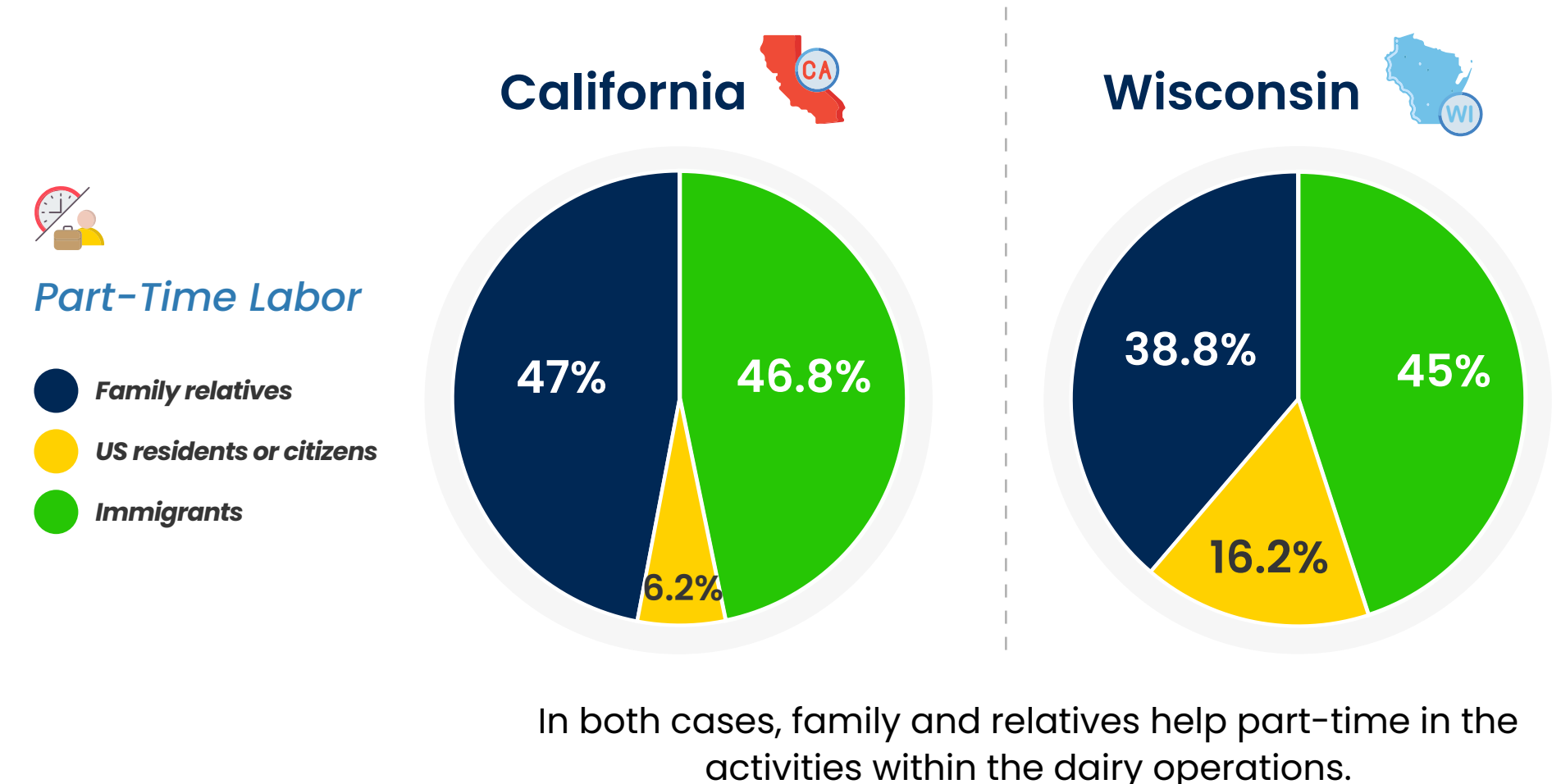Dairy farms rely heavily on workers. The two states alone hire around

35,000 Workers every year

Fig. 1 – Labor Sources in Both States

There is a distinctive regional difference in labor sources. For **full-time** workers

California
Full-Time Labor
- Family relatives
- US residents or citizens
- Immigrants

8.9% · 43% · 48.1%

Wisconsin
49.4% · 32.5% · 18.2%

Most workers are either immigrants or US residents

Dairies depend mostly on family to help on the farm

Although, there is similarities for **part-time** workers:

California
Part-Time Labor
- Family relatives
- US residents or citizens
- Immigrants

47% · 6.2% · 46.8%

Wisconsin
38.8% · 16.2% · 45%

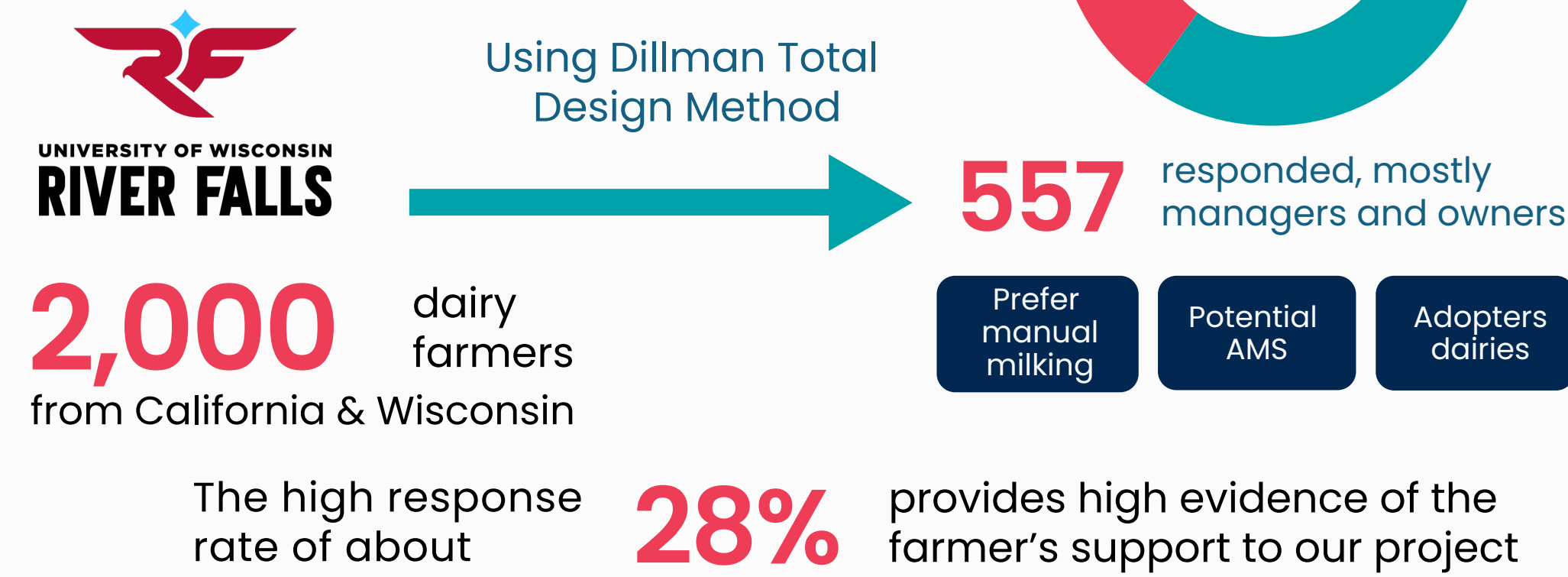In both cases, family and relatives help part-time in the activities within the dairy operations.

Objectives of the study

This project explores the perception of dairy farmers on labor issues and adoption of automated systems. We aim to:

1 Understand the challenges faced by farmers regarding labor retention and supervision
2 Learn about other automated machines used in dairy operations
3 Analyze the barriers and motivators to adopt automated milking systems

Survey

A survey was conducted in Spring 2024, during an eight-week period:

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Using Dillman Total Design Method

557 responded, mostly managers and owners

2,000 dairy farmers from California & Wisconsin

- Prefer manual milking
- Potential AMS
- Adopters dairies

The high response rate of about **28%** provides high evidence of the farmer's support to our project

The survey asked questions regarding labor issues, technology adoption, dairy policy programs and sustainability. Here, we will be focusing solely on labor and automation.
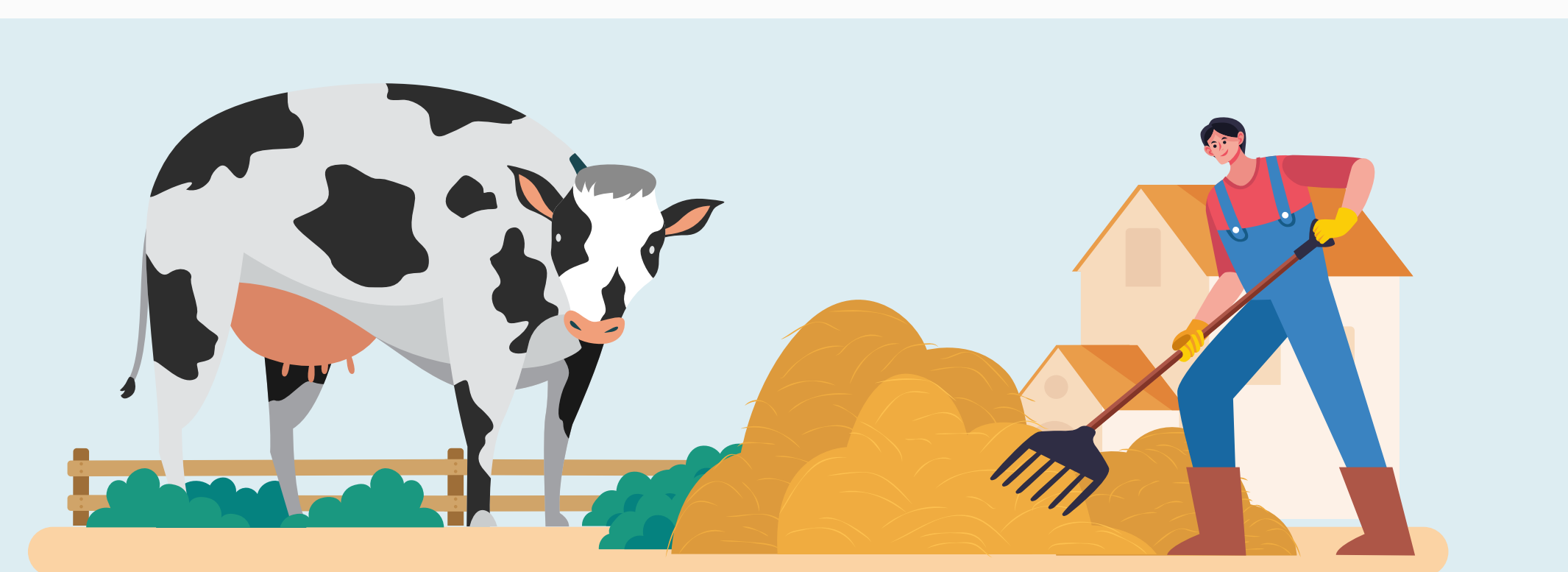
Farmers' Characteristics

AGE
54% are middle-aged farmers

INCOME
78% of farmers earn $<150,000 per year

FARM PRACTICE
Only **9%** are organic farms

Fig. 2 - Labor Issues in Dairies

Farmers that hired workers last year (**N = 256**) were asked regarding:

Finding High-Quality Workers
Category: Highly difficult / Difficult / Easy
(AMS farmers, Potential adopter, Prefer manual milking — Do not use AMS)

1/3 of farmers expressed substantial difficulties finding high-quality workers

Training Workers
(AMS farmers, Potential adopter, Prefer manual milking — Do not use AMS)

Those who are considering milking automation are facing more difficulties training workers

Supervising Workers
Category: Highly difficult / Difficult / Easy
(AMS farmers, Potential adopter, Prefer manual milking — Do not use AMS)

Likewise, potential adopters are the ones with more challenges supervising employees.

Retaining Workers
(AMS farmers, Potential adopter, Prefer manual milking)

>1/2 of all respondents stated difficulties retaining workers

Automation

Many dairy activities can be automated, which can help farm workers to decrease the effort and time on those tasks.

%

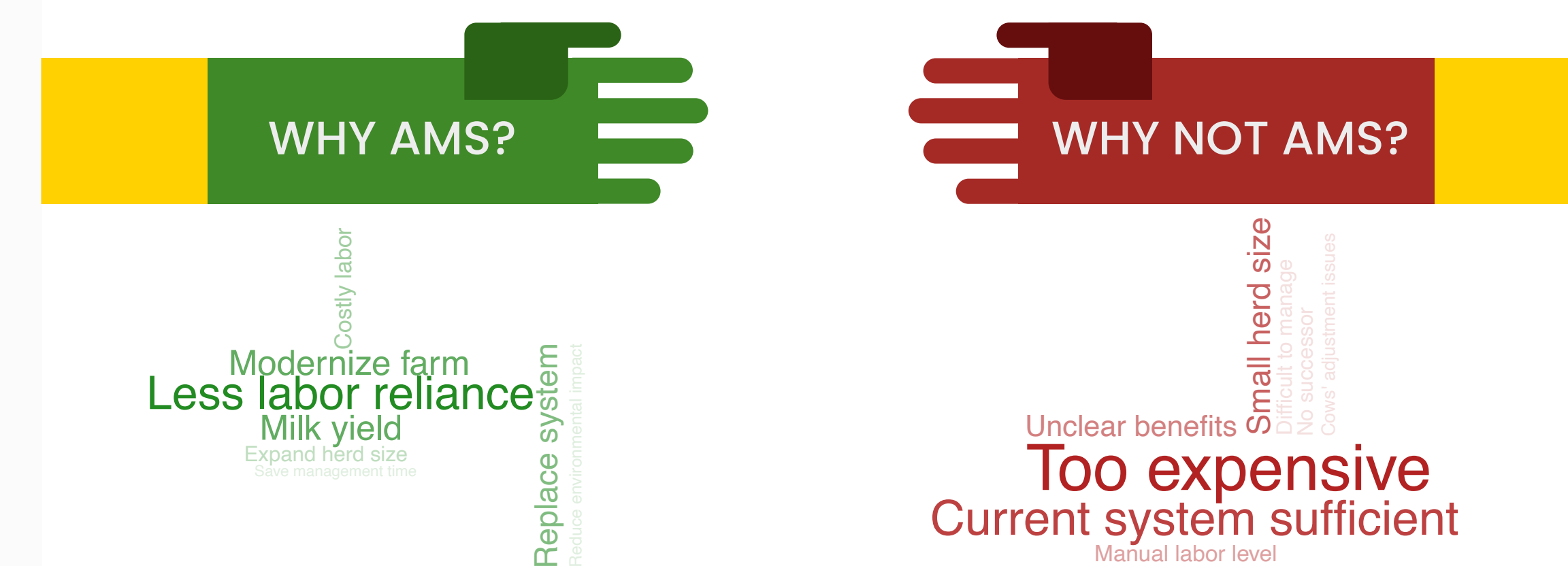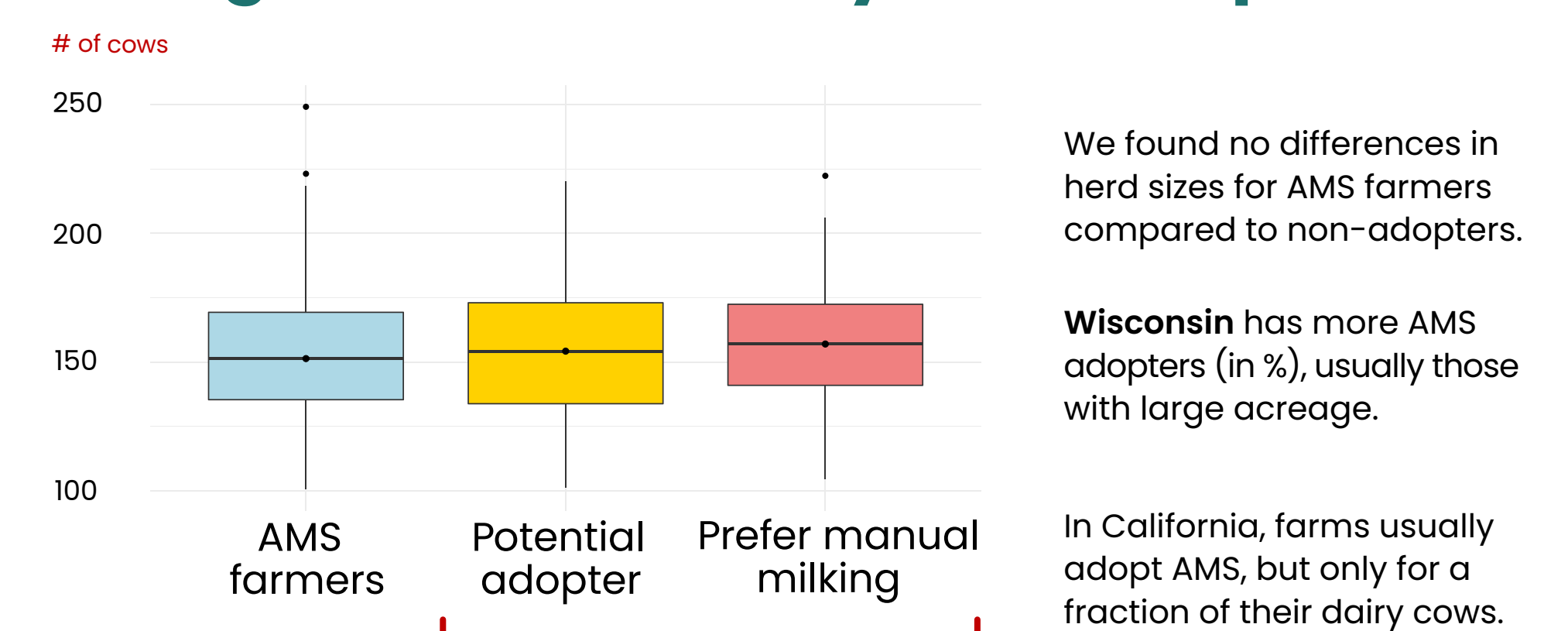| Washer	Cluster Remover	Scrapers	Feeders
33.4%	26.4%	9.4%	3.95%
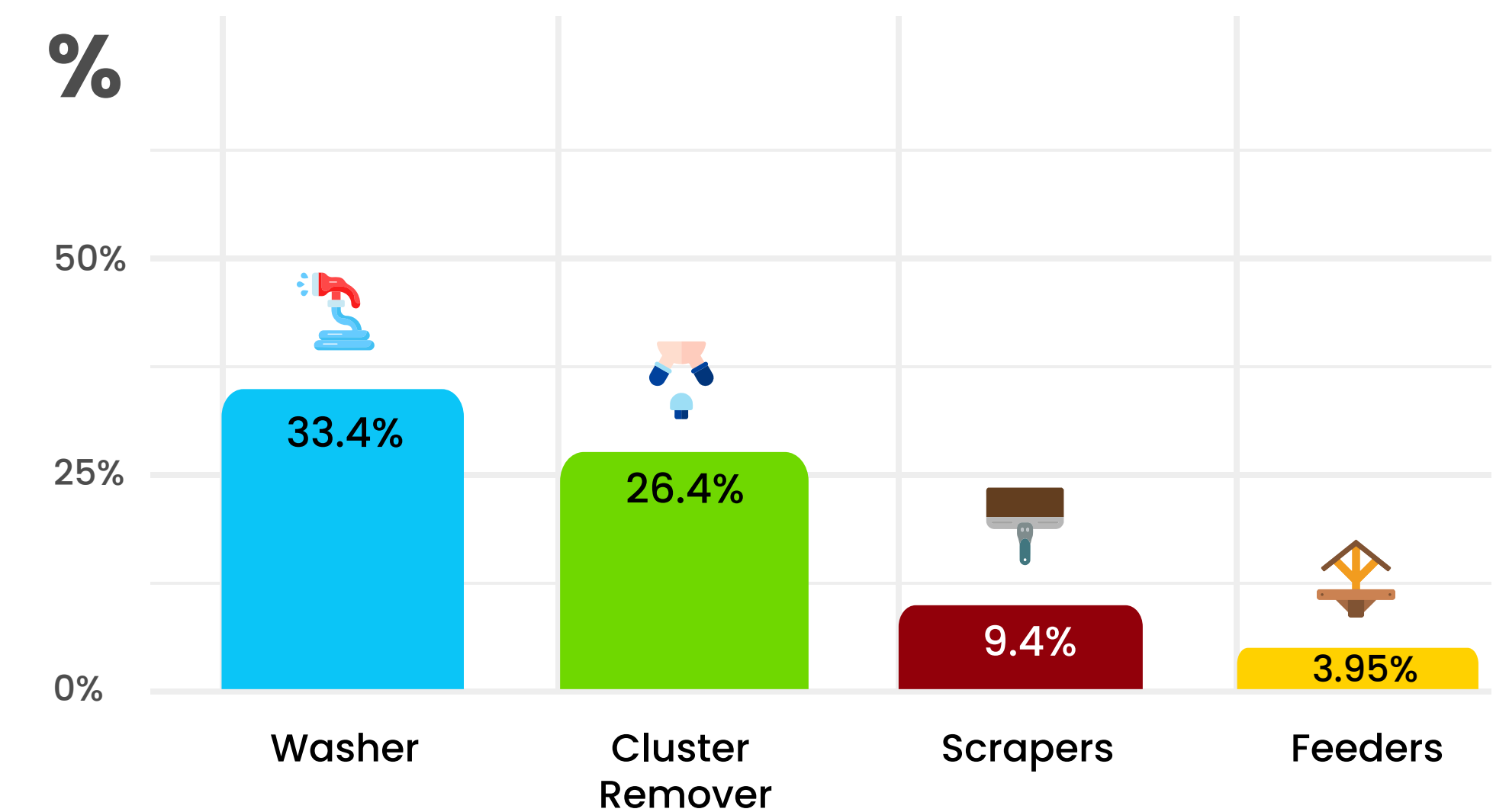
Most common technologies adopted in dairy farms are

Automated washer: to clean milking equipment & parlors

Automated cluster removers: to detach the cluster from the cows' udder after milking

An emergent technology that seeks to mechanize the milking process is the **Automated Milking Systems (AMS)**

AMS are robotic boxes able to milk **60 - 70** dairy cows per day

However, a robot requires an investment of **~$250,000**

Fig. 3 – Farm size by AMS adoption

of cows: 250 / 200 / 150 / 100

(AMS farmers, Potential adopter, Prefer manual milking — Do not use AMS)

We found no differences in herd sizes for AMS farmers compared to non-adopters.

Wisconsin has more AMS adopters (in %), usually those with large acreage.

In California, farms usually adopt AMS, but only for a fraction of their dairy cows.

WHY AMS?
Costly labor · Modernize farm · Less labor reliance · Milk yield · Expand herd size · Replace system

WHY NOT AMS?
Small herd size · Unclear benefits · Too expensive · Current system sufficient · Manual labor level

Conclusions and Final Remarks

- Our results show that labor turnover represents an important stressor for dairy farmers.
- Automation is not yet a viable alternative for many farmers due to its large upfront cost.