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**Farm management factors influencing bulk milk somatic cell  
count in  
Irish dairy herds**

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Session 11

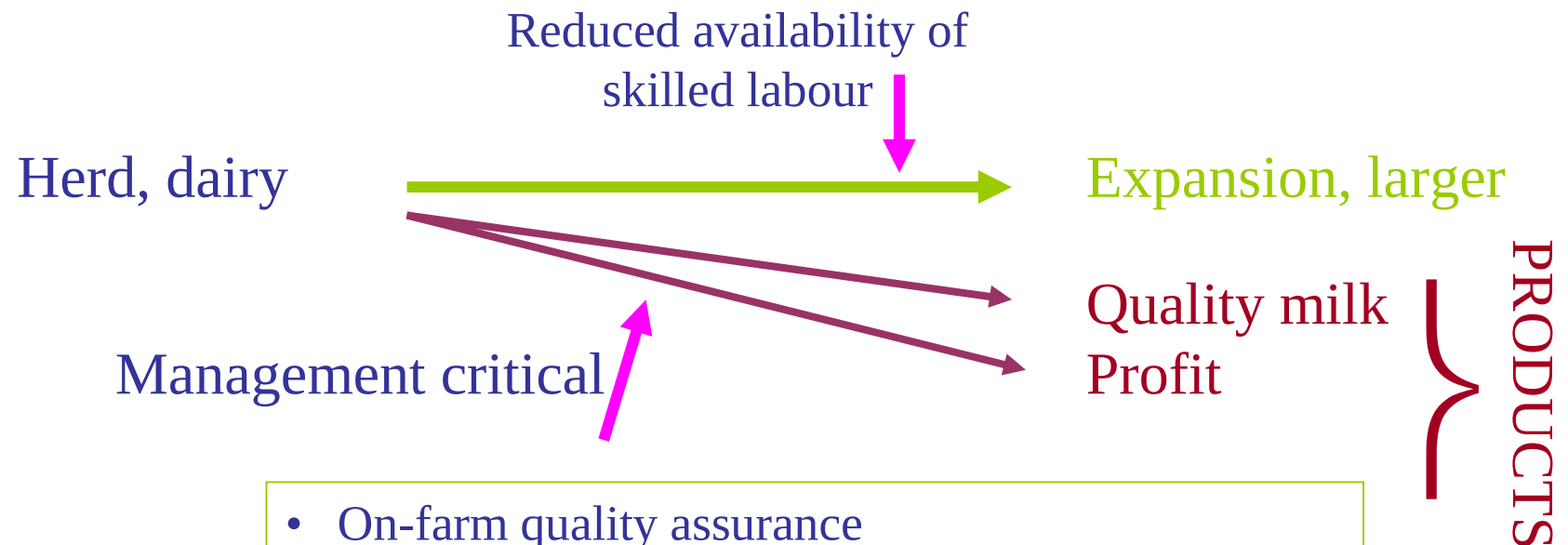
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# Current question

How to manage the enterprise for both milk quality and profitability

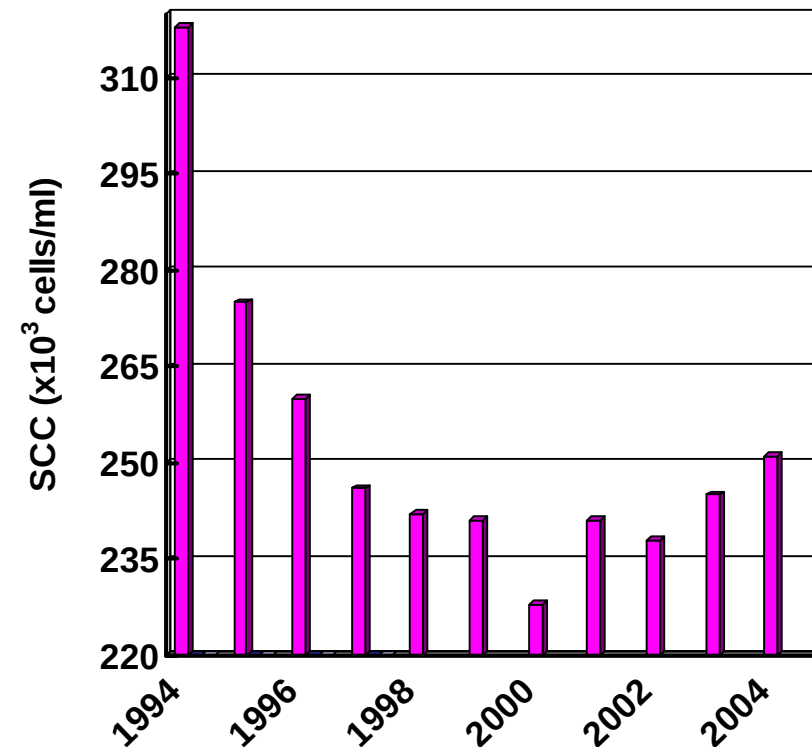
Increasing % of milk produced on farms of > 100 cows



- On-farm quality assurance
- Milk Quality defn: SCC, TBC, compositional, functional characteristics, etc.

# Temporal trends of bulk milk SCC data from Irish dairy farms over 10 year period

- 9,113 herds in 3 Co-op areas
- 2.75M records 1994 to 2004
- Decrease in geometric mean SCC between 1994 and 2000
- SCC increased gradually between 2000 and 2004 ( $\sim 5 \times 10^3/\text{ml}$  per year)
- SCC for 2001-2004 greater ( $p < 0.01$ ) than those for 2000



# Context

- **Objective: to produce milk of low SCC**
  - Ultimate target:  $<150 \times 10^3$  SCC/ml
- **SCC – complex**
  - Time to manifest itself
  - Intensity of problem can be influenced by baseline SCC }cause+effect
- **Why: High SCC –problem for production and processing**
- **Producer:**
  - reduced milk yield, reduced milk price, application of penalties, cost of treatment, labour demand
- **Processor:**
  - Altered milk composition and functional properties, UHT milk, cultured dairy products, Cheese yield efficiency (KPI) ( $< 100 \times 10^3$  cells/ml) (Barbano *et al.*, JDS, 1991; Politis *et al.*, JDS, 1988)
- **Aim: Determine the on-farm factors influencing SCC on farms by survey and create awareness**
  - \*Other reports - Irish scenario – seasonal production

# Methodology – data + survey

## Target

- Obtain milk supply data-volume and SCC data for ~ 400 herds
- Conduct 2 questionnaire surveys on those herds
- To relate the management practises on-farm to SCC data by statistical analysis

## Tasks

- Milk volume records of ~4000 suppliers to 1 milk processor were obtained
- A representative random sample based on annual milk supply volume was selected = 398 farms
- BT SCC data obtained
- Questionnaire – milking process (70 Q) – Apr-Jul
- Questionnaire – winter housing management (50 Q) Dec-Mar

# Methodology – data analysis

- Natural log of all test day SCC data - all collections – 365 d was calculated
- **SCS** (av. nat log SCC)
- Series of analysis – each separate, individual, variable was tested against SCS
- **Each variable significant at  $P < 0.05$  was deemed to affect SCS**
- Multiple regression model developed using PROC GLM (adjusted for confounding effects)

# Farm Description

## 398 Farms

Av. Herd size : 50 cows (12-293)

Av. Milk volume:  $218 \times 10^3$  L (17 -1,324)

Av. Bulk tank SCC:  $283 \times 10^3$ /ml (82-773)

% herds milked while cows indoors

|        |   |    |
|--------|---|----|
| Spring | – | 66 |
| Autumn | – | 67 |

Most prevalent bacteria type found in the bulk tank was staph. aureus

# Milking Facilities

Side x side – 45%  
Herringbone – 48%

Direct line – 62%  
Recorder – 38%

Cow : unit

Ratio=7

ACR

5%

Recommended  
vacuum level

47-50kPa: 69%

Unit no.

<7 – 46%

7-8 – 24%

>8 – 29%

Liner changes  
≥ 1/year: 64%



# Preparation for milking – all year

|                         |      |
|-------------------------|------|
| • Foremilk + wash + dry | 1 %  |
| • Foremilk + wash       | 8 %  |
| • Foremilk + dry wipe   | 7 %  |
| • Foremilk              | 13 % |
| • Wash + dry            | <1 % |
| • Wash                  | 3 %  |
| • Dry wipe              | 7 %  |
| • No preparation        | 17 % |

# Cow preparation in Spring

(Jan – April)

| <b>Practise</b>              | <b>(P = NS)</b> | <b>% herds</b> | <b>SCC (x10<sup>3</sup>/ml)</b> |
|------------------------------|-----------------|----------------|---------------------------------|
| Wash                         |                 | 22             | 258                             |
| Wash & dry with paper        |                 | 5              | 251                             |
| Wash & dry with common cloth |                 | 3              | <u>242</u>                      |
| Dry wipe                     |                 | 24             | 246                             |
| No preparation               |                 | 46             | <u>260</u>                      |
| Difference (max – min)       |                 |                | <u>18</u>                       |

# Cow preparation in Summer

(May – Sept)

| <b>Practise</b>              | <b>(P=NS)</b> | <b>% herds</b> | <b>SCC (x10<sup>3</sup>/ml)</b> |
|------------------------------|---------------|----------------|---------------------------------|
| Wash                         |               | 16             | <u>269</u>                      |
| Wash & dry with paper        |               | 2              | <u>213</u>                      |
| Wash & dry with common cloth |               | 2              | 256                             |
| Dry wipe                     |               | 26             | 250                             |
| No preparation               |               | 54             | 259                             |
| Difference (max – min)       |               |                | <u>56</u>                       |

# Cow preparation in Winter

(Oct – Dec)

| Practise                     | (P= NS) | % herds | SCC (x10 <sup>3</sup> /ml) |
|------------------------------|---------|---------|----------------------------|
| Wash                         |         | 22      | <u>391</u>                 |
| Wash & dry with paper        |         | 7       | 345                        |
| Wash & dry with common cloth |         | 4       | 370                        |
| Dry wipe                     |         | 22      | <u>341</u>                 |
| No preparation               |         | 45      | 364                        |
| Difference (max – min)       |         |         | <u>50</u>                  |

| Practice                                          | % herds | SCC (x10 <sup>3</sup> /ml) |
|---------------------------------------------------|---------|----------------------------|
| <b>Teat disinfection post-milking (P&lt;0.05)</b> |         |                            |
| Always                                            | 69      | 267                        |
| Intermittent                                      | 9       | 281                        |
| Never                                             | 22      | 298                        |
| <b>Dry cow therapy (P&lt;0.05)</b>                |         |                            |
| Yes                                               | 96      | 273                        |
| No                                                | 4       | 342                        |
| <b>Milk recording (P&lt;0.01)</b>                 |         |                            |
| Yes                                               | 49      | 259                        |
| No                                                | 51      | 292                        |

# Hygiene Status

| Herd Factor     | % herds   | SCC (x10 <sup>3</sup> /ml) |
|-----------------|-----------|----------------------------|
| Milking Parlour | (P<0.01)  |                            |
| Clean           | 43        | 255                        |
| Dirty           | 9         | 297                        |
| Cluster         | (P<0.001) |                            |
| Clean           | 42        | 256                        |
| Dirty           | 13        | 317                        |
| Liners          | (P<0.05)  |                            |
| Good            | 81        | 264                        |
| Worn            | 7         | 324                        |
| Roadway         | (P<0.05)  |                            |
| Clean           | 25        | 269                        |
| Dirty           | 24        | 311                        |

# Winter Housing

**Cows in Cubicles : 81%**

**Cubicle: cow ratio  $\geq 1$   57%**

**In – calf heifers in cubicles: 68%**

# Winter management in cubicle housing

| Herd factor                                       | % herds | SCC (x10 <sup>3</sup> /ml) |
|---------------------------------------------------|---------|----------------------------|
| <b>Bedding</b> (P<0.001)                          |         |                            |
| Lime on mats                                      | 34      | 242                        |
| Mats only                                         | 20      | 271                        |
| Lime on concrete floor                            | 17      | 301                        |
| Concrete floor                                    | 11      | 301                        |
| Sawdust on mats                                   | 4       | 231                        |
| <b>Passageway cleaning</b> (P<0.001)              |         |                            |
| Automatic scraper                                 | 55      | 257                        |
| Tractor & scraper                                 | 23      | 294                        |
| <b>Frequency of passageway cleaning</b> (P<0.001) |         |                            |
| Once a day                                        | 24      | 301                        |
| Twice a day                                       | 12      | 258                        |
| 4h intervals                                      | 18      | 244                        |
| <b>Cubicle stand Cleaning</b> (P<0.01)            |         |                            |
| Once a day                                        | 46      | 265                        |
| Twice a day                                       | 37      | 250                        |



# Hygiene Status

| Herd Factor            | % herds   | SCC (x10 <sup>3</sup> /ml) |
|------------------------|-----------|----------------------------|
| <b>Cubicle House</b>   |           | <b>(P&lt;0.001)</b>        |
| <b>Clean</b>           | <b>43</b> | <b>256</b>                 |
| <b>Dirty</b>           | <b>14</b> | <b>310</b>                 |
| <b>Cubicle Stands</b>  |           | <b>(P&lt;0.001)</b>        |
| <b>Clean</b>           | <b>56</b> | <b>249</b>                 |
| <b>Dirty</b>           | <b>9</b>  | <b>315</b>                 |
| <b>Clean cow Udder</b> | <b>34</b> | <b>262</b>                 |
| <b>Clean cow legs</b>  | <b>30</b> | <b>258</b>                 |
| <b>Clean cow Tails</b> | <b>59</b> | <b>259</b>                 |

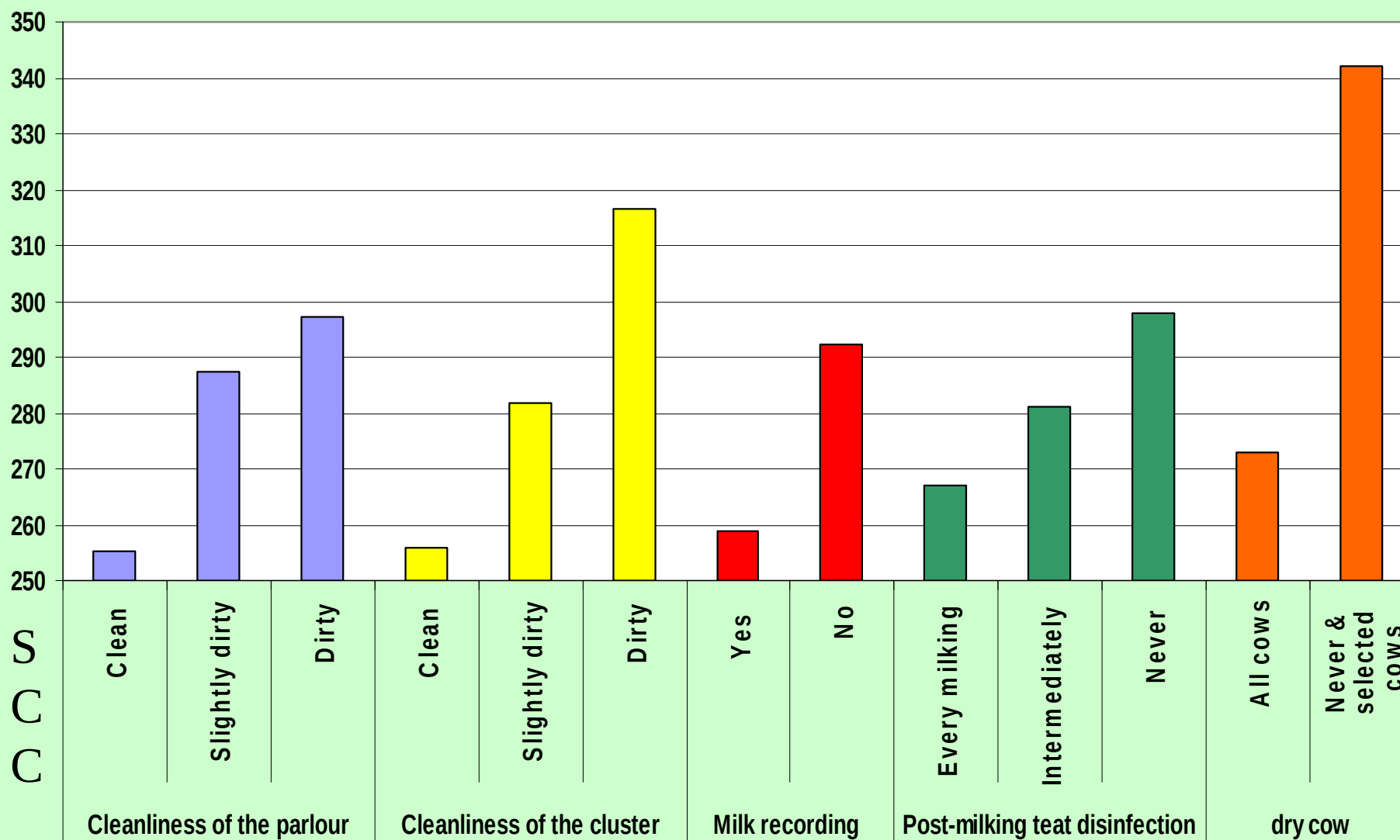
## **Summary of factors having a statistically significant effect on milk SCC**

- **Milk volume**
- **Post-milking teat disinfection**
- **Dry cow therapy**
- **Milk recorded herds**
- **Hot water in parlour**

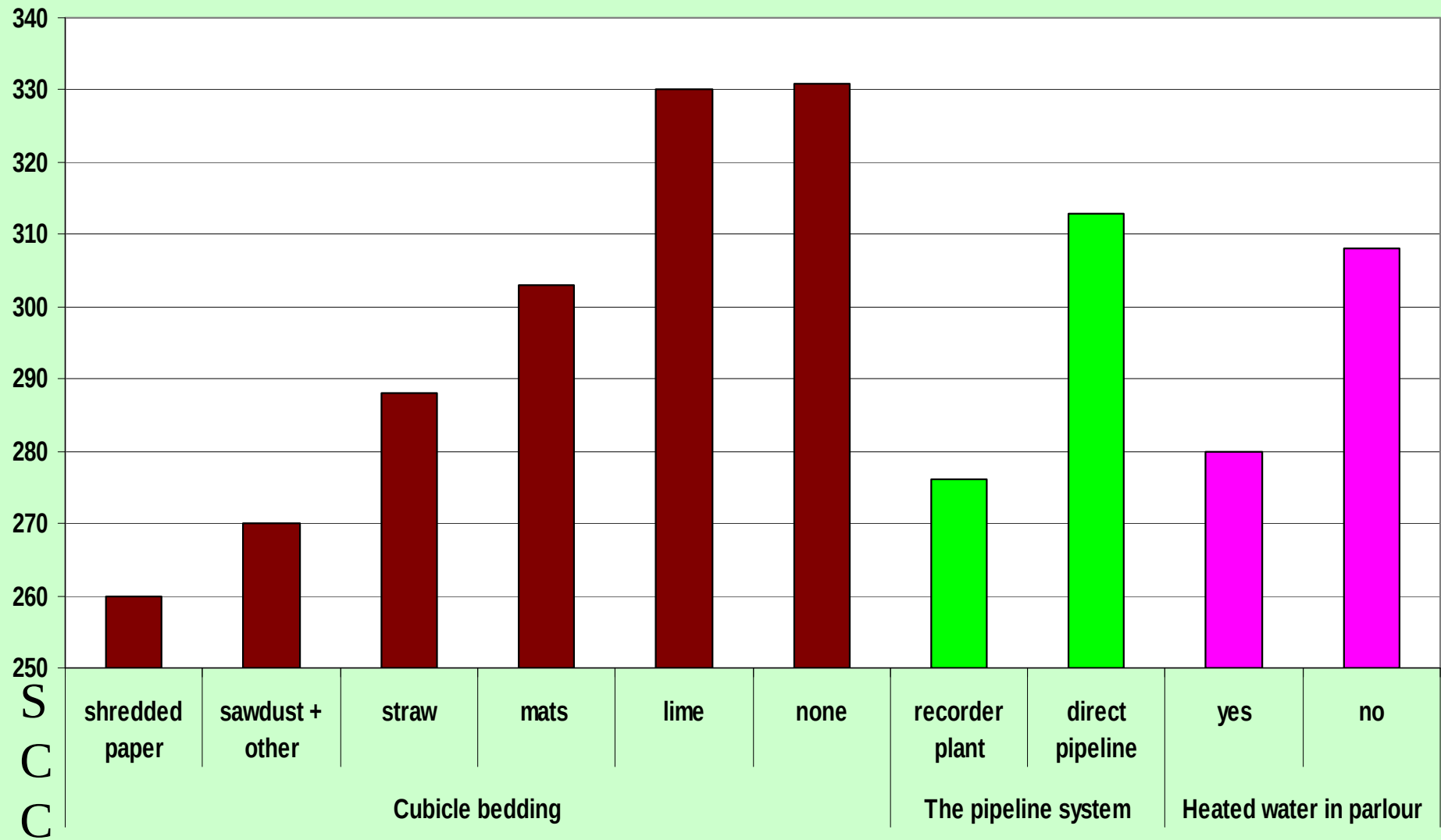
- **Frequency of winter house cleaning**
- **Cubicle bedding**
- **Hygiene of milking & housing facilities**

(Parlour, cluster, shed passageway, cubicles & roadway)

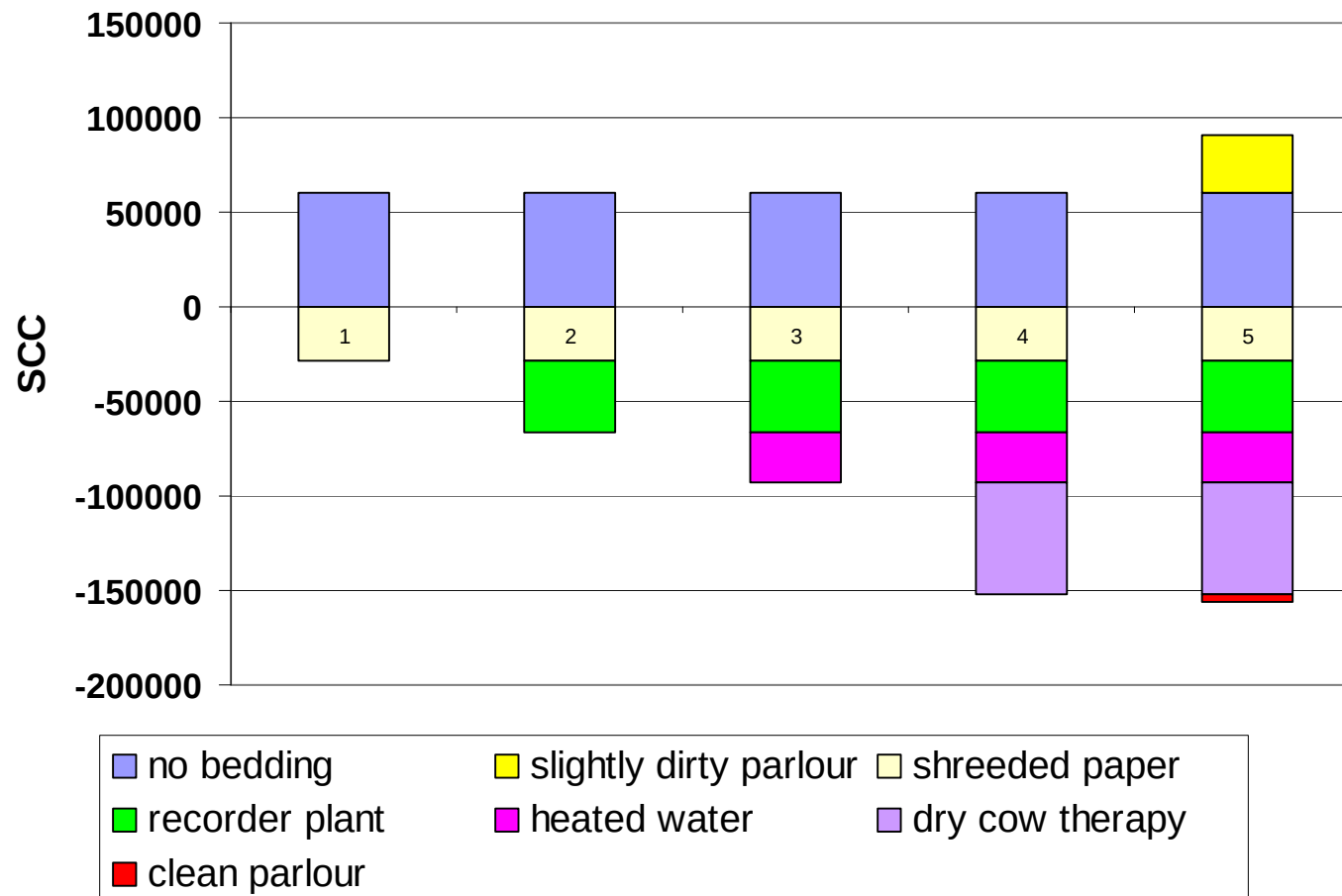
## Effect of selected milking practises on milk SCC



## Effect of selected practises on milk SCC



# Combined model for SCC



# Discussion 1

- Herd selection procedure different to other studies
- Milk volume – dilution
- Milk recording – knowledge about cow and attention to detail
- Teat disinfection - 22% not complying – advice, results, correct application
- Liners - why liners not changed >1/year on 36% farms
- Roadway – particularly first 100m
- Heated water
- High SCC associated with dirty parlour and cluster (also Barkema *et al.*, JDS, 1998)
- Dirty cows - udders and lower rear legs had higher prevalence of subclinical mastitis (Reneau *et al.*, NMC, 2003)
- Contamination of the cluster with staph - indication of potential mastitis
- Hygiene scores of udders – preformed as quality control measure

## Discussion 2

- **SCC increased in Winter –dilution or dirtier conditions**
- **More manure in stalls and less frequent cleaning associated with high SCC levels (Shukken *et al*, 1991)**
- **Current study – hygiene of cow/bedding – manure handling, type of bedding and maintenance of cow beds all significant**
- **Sawdust and lime on mats very good**
- **Automatic scraper effectiveness**

# Discussion 3

- **Fundamental issue re Mastitis : exposure to pathogens or bacteria in the environment and transmission from cow to cow**

## **Control:**

- **Decrease level in the environment**
- **Decrease level of transmission**

## **As a manager**

### **Monitor:**

- **Animal**
- **Facility**
- **Operation / sequence of duties**



# Conclusions

- Agreement with other studies – no specific issues for Ireland
- Production of quality milk is a management issue NOT a technical issue
- Attention to detail - hygiene status of the farm environment – bacteria – transmission
- Perceive as a PROCESS
  - Critically examine overall operation
  - Examine every point along the process
  - Systematic approach

Go raibh maith agat

