

# Longitudinal study of comfort around resting and its correlation with reproductive efficiency in dairy cows in Southern Spain.

Molina L. , Agüera E. , Sánchez J.M. , Pérez-Marín C.C.

*Dept Animal Medicine & Surgery and Research Group AGR-019,  
University of Cordoba, Spain*



**FIRST DAIRY CARE CONFERENCE, COPENHAGUE.2014**





# GUIDELINE

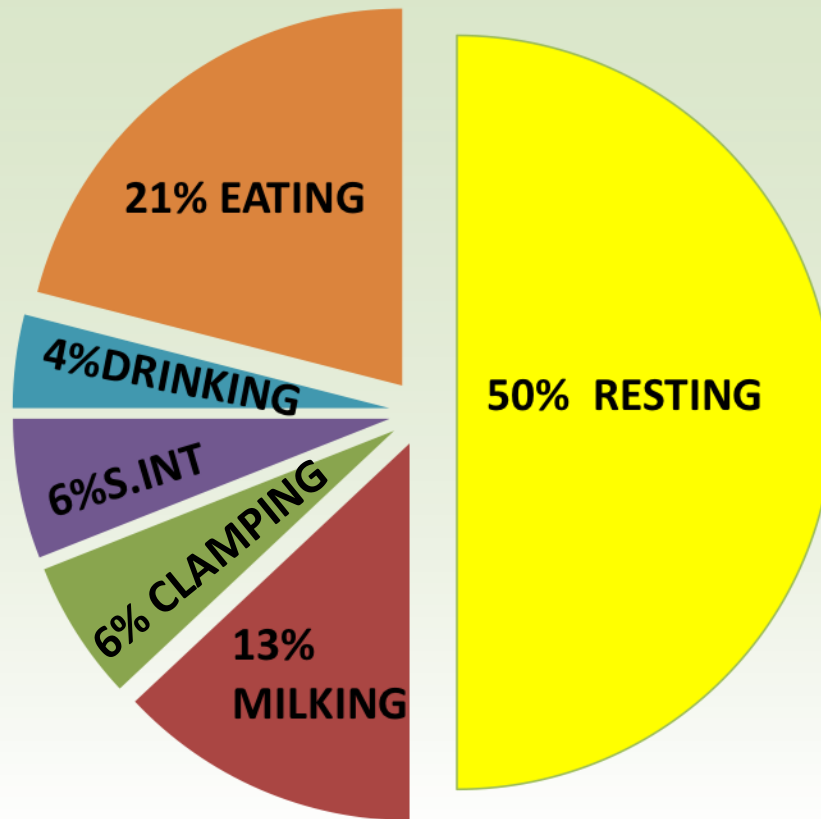
- **INTRODUCTION**
- **MATERIAL AND METHODS**
- **OBJECTIVES**
- **RESULTS AND DISCUSSION**
- **CONCLUSIONS**



# INTRODUCTION (RESTING)



- Lying is the highest priority in dairy cows, before eating and social behaviours (*Munksgaard et al., 2005*).
- Optimum distribution of activities by *Michael, 2000*



- Moderate feed restriction-continuous lying deprivation (*Fisher et al., 2002*)

**Comfort around the resting** BY WELFARE QUALITY is measured :

MEASURES	NORMAL	MODERATE PROBLEM	SERIOUS PROBLEM
Time needed to lie down	$\leq 5,20s$	$5,20s < \leq 6,30s$	$> 6,30s$
Frequency of animals lying partly or completely outside the supposed lying area	$\leq 3\%$	$3\% < \leq 5\%$	$> 5\%$
Frequency of collisions with housing equipment during lying down	$\leq 20\%$	$20\% < \leq 30\%$	$> 30\%$
Cleanliness: lower legs	$\leq 20\%$	$20\% < \leq 50\%$	$> 50\%$
Cleanliness: hind quarters	$\leq 10\%$	$10\% < \leq 19\%$	$> 19\%$
Cleanliness: udder	$\leq 10\%$	$10\% < \leq 19\%$	$> 19\%$



# INTRODUCTION (REPRODUCTION)



- The intensity of signs of oestrus is the most important indicator of well-being in high producing cows (*García et al., 2011*).
- Factors related to environment, nutrition, herd mates, and condition of feet and legs dramatically affect oestrus detection (*O'Connor, 2007*).



# INTRODUCTION (REPRODUCTION)

## METHODS TO IMPROVE OESTRUS DETECTION

### A. MANAGEMENT:

- a.1 Improve cow identification
- a.2 Nutrition and health
- a.3 Good footing surface
- a.4 Employee responsibility
- a.5 Moment of detection measures
- a.6 Oestrus synchronization program



# INTRODUCTION (REPRODUCTION)



## B. DEVICES for oestrus detection:

### 1 . Kamar



### 2. Pedometer



# INTRODUCTION (REPRODUCTION)



- Each method has its advantages and disadvantages and each farmer chooses it depending on size and type of livestock and veterinary recommendations.
- If we have a good oestrus detection, we will have a good fertility although other factors are involved (milk production, season, postpartum diseases and so on).





There are several studies which relate udder and leg hygiene scores and subclinical mastitis (*Schreiner et al., 2003*), but there are not many works that evaluate the relationship between welfare indicators and reproductive rates.

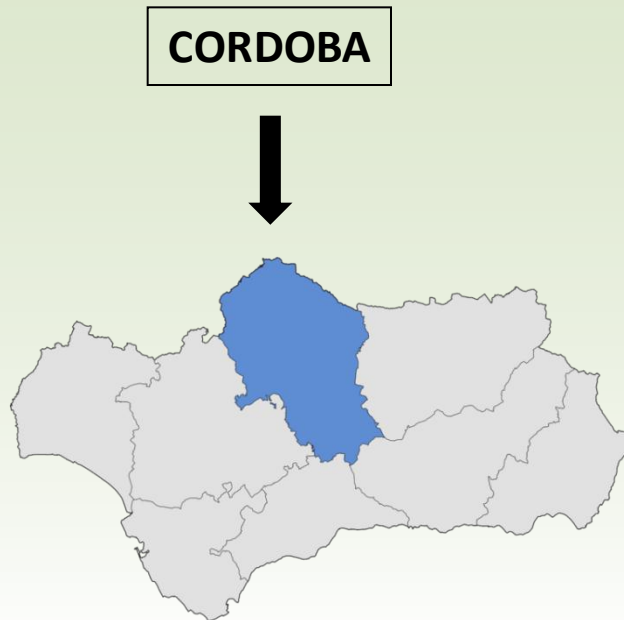
### **Aim of this study:**

To analyze the relationship between some welfare indicators and heat detection and fertility.



# MATERIAL AND METHODS

- Six farms were evaluated every year ( October 2012, April 2013 and April 2014).
- These farms were situated in Southern Spain.



# MATERIAL AND METHODS



4/6 farms : cubicle (A, B, C, E)

2/6 farms: straw yards (D, F)

**FARM A**



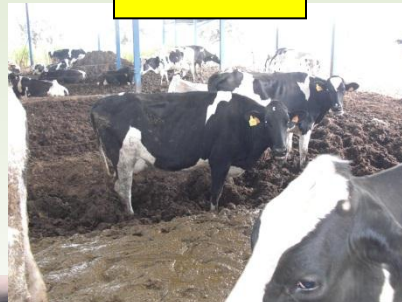
**FARM B**



**FARM C**



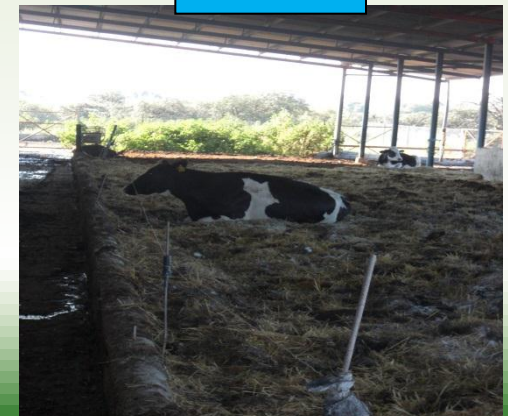
**FARM E**



**FARM D**



**FARM F**





# MATERIAL AND METHODS



-Cows are milked twice a day.



- Animals are feeding in a intensive system and they do not go outside of pen.



# MATERIAL AND METHODS



Measures about **COMFORT AROUND THE RESTING** taken on farm:

1. Time needed to lie down
2. Frequency of animals lying partly or completely outside the supposed lying area
3. Frequency of collisions with housing equipment during lying down

All are evaluated as follow:

- Dividing the area in question in not more that 6 segments.
- Per segment not more than 25 cows.
- Overall observation time: 120 minutes, that is to say, 10 minutes per segment hourly.
- Minimum sample size 6 cows.

## TIME NEEDED TO LIE DOWN

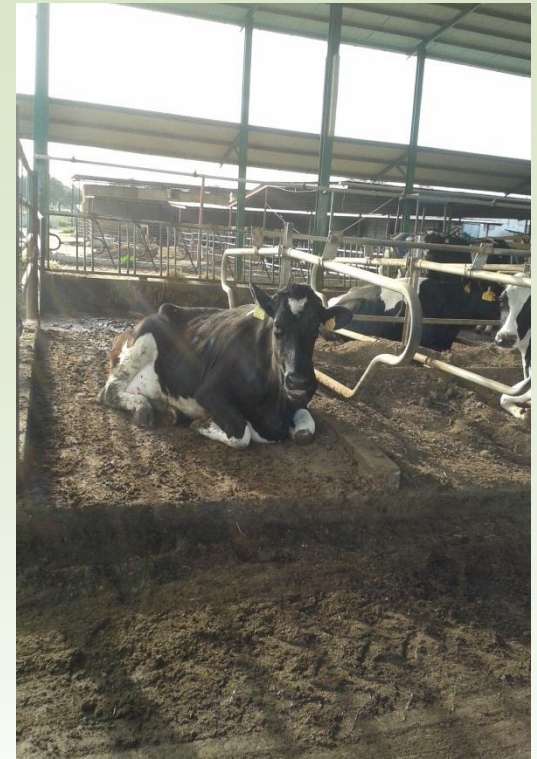




# MATERIAL AND METHODS



## FREQUENCY OF ANIMALS LYING PARTLY OR COMPLETELY OUTSIDE THE SUPPOSED LYING AREA



## FREQUENCY OF COLLISIONS WITH HOUSING EQUIPMENT DURING LYING DOWN

# MATERIAL AND METHODS



## CLEANLINESS

- 4. Cleanliness: lower legs
- 5. Cleanliness: hind quarters
- 6. Cleanliness: udder



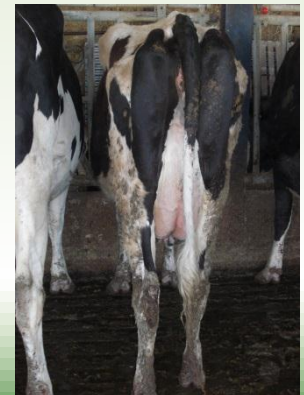
### ➔ Considerations and how to evaluate the cleanning:

- It is assessed one side of the body and from behing.
- Lower legs: including the hock.
- Hind quarters: upper hind leg, flank and rear view including tail
- The udder .
- Degree of dirty is:

- Splashing



- Plaques



# MATERIAL AND METHODS



FARM	2012		2013		2014	
	H.S	WQ	H.S	WQ	H.S	WQ
<b>A</b>	140	<b>57</b>	153	<b>59</b>	165	<b>62</b>
<b>B</b>	75	<b>44</b>	95	<b>49</b>	100	<b>49</b>
<b>C</b>	66	<b>41</b>	82	<b>44</b>	92	<b>47</b>
<b>D</b>	76	<b>44</b>	81	<b>44</b>	93	<b>47</b>
<b>E</b>	67	<b>41</b>	76	<b>44</b>	73	<b>41</b>
<b>F</b>	70	<b>41</b>	71	<b>41</b>	100	<b>49</b>
<b>TO</b>	494	<b>268</b>	558	<b>281</b>	623	<b>295</b>

Herd size	Number of animals to score (suggestion A)	If A is not feasible
30	30	30
40	30	30
50	33	30
60	37	32
70	41	35
80	44	37
90	47	39
100	49	40
110	52	42
120	54	43
130	55	45
140	57	46
150	59	47
160	60	48
170	62	48
180	63	49
190	64	50
200	65	51
210	66	51
220	67	52
230	68	52
240	69	53
250	70	53
260	70	54

*Welfare Quality*



# MATERIAL AND METHODS



## CLEANLINESS LOWER LEGS

### - INDIVIDUAL LEVEL:

0: no dirty o minor splashing

2: separate o continuous plaques of dirty

### - HERD LEVEL:

- % clean

- %dirty



# MATERIAL AND METHODS



## CLEANLINESS HIND QUARTERS

### - INDIVIDUAL LEVEL:

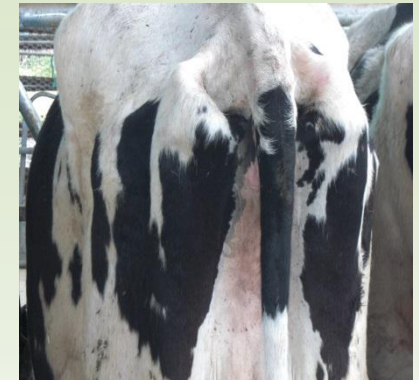
0: no dirty or minor splashing

2: separate or continuous plaques of dirty

### - HERD LEVEL:

- % clean

- %dirty





# MATERIAL AND METHODS



## UDDER

### - INDIVIDUAL LEVEL:

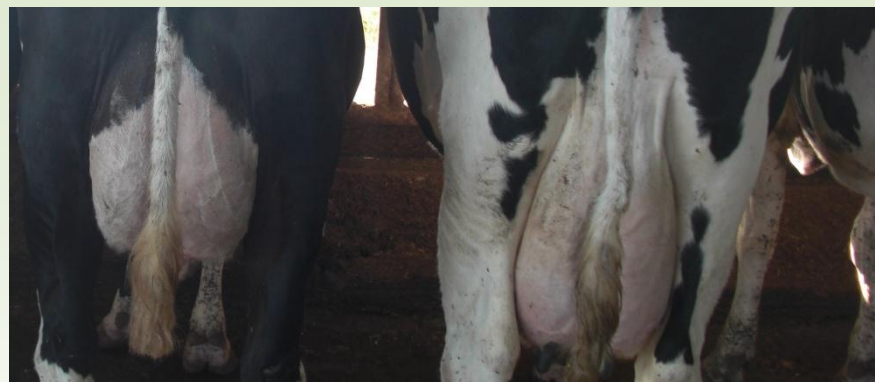
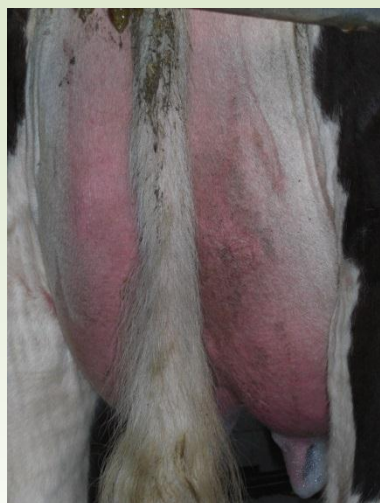
0: no dirty o minor splashing

2: separate o continuous plaques of dirty

### - HERD LEVEL:

- % clean

- %dirty





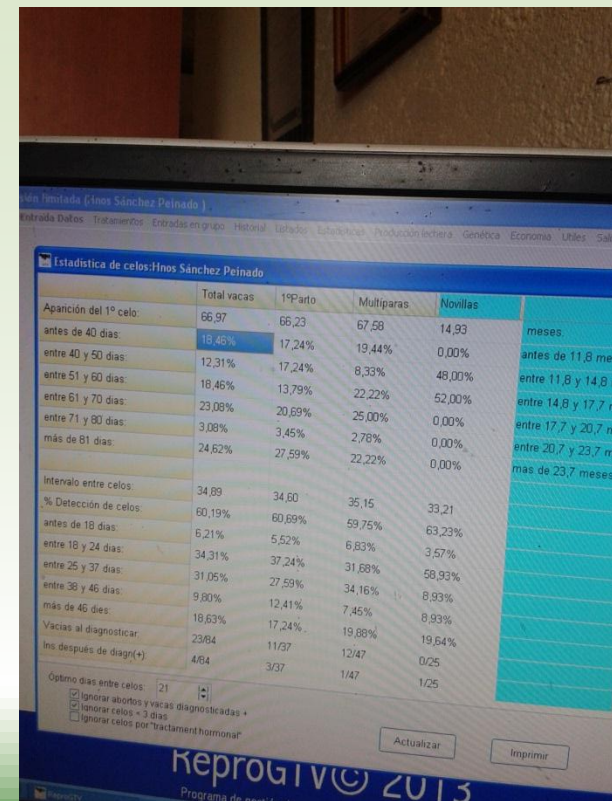
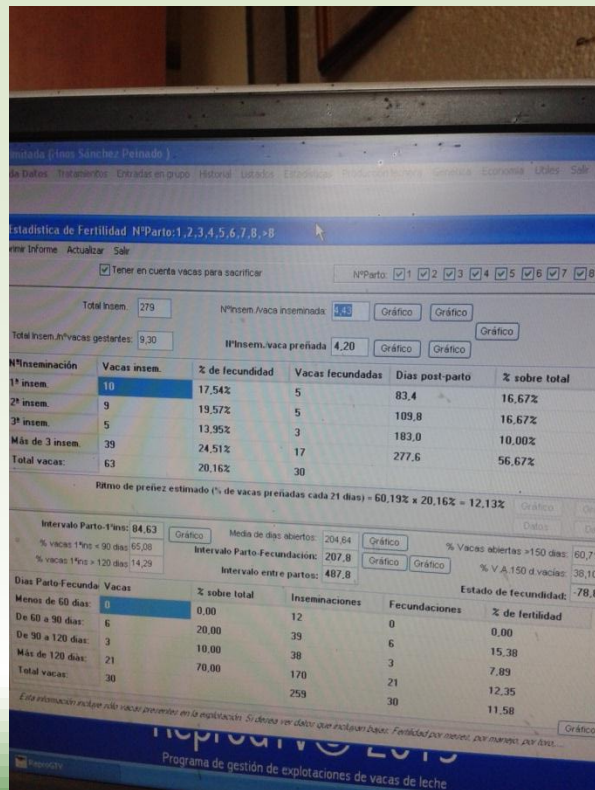
# MATERIAL AND METHODS



## REPRODUCTIVE DATA

### 1. HEAT DETECTION

### 2. FERTILITY



# RESULTS AND DISCUSSION



## TIME NEEDED TO LIE DOWN

FARM	2012	2013	2014
A	6,25	7,69	5,8
B	3,75	3,37	5,69
C	3,3	5	6,51
D	5,25	8	5,56
E	3,4	4,06	6,08
F	3,5	6,5	5,15



	Normal	Moderate problem	Serious problem
Time need to lie down	$\leq 5,20s$	$5,20s < \leq 6,30s$	$> 6,30s$

# RESULTS AND DISCUSSION



## FREQUENCY OF ANIMALS LYING PARTLY OR COMPLETELY OUTSIDE THE SUPPOSED LYING AREA

MEASURE	Normal	Moderate problem	Serious problem
Frequency of animals lying partly or completely outside the supposed lying area	$\leq 3\%$	$3\% < \leq 5\%$	$> 5\%$

In each farm and in every year, this value was **less** than **3 %**



# RESULTS AND DISCUSSION



## FREQUENCY OF COLLISIONS WITH HOUSING EQUIPMENT DURING LYING DOWN

MEASURE	Normal	Moderate problem	Serious problem
Frequency of collisions with housing equipment during lying down	$\leq 20\%$	$20\% < \leq 30\%$	$> 30\%$

In each farm and in every year, this value was **less** than **20 %**

# RESULTS AND DISCUSSION



## CLEANLINESS: LOWER LEGS (LL)

FARM	12	13	14
<b>A</b>	6,25	32,31	12,7
<b>B</b>	23,1	24,5	17,31
<b>C</b>	11,5	34,05	18,37
<b><u>D<sub>straw</sub></u></b>	86,49	98,2	36,74
<b>E</b>	14,3	39,14	18,19
<b><u>F<sub>straw</sub></u></b>	85,8	63,64	23,34

Cleanliness LL

≤ 20%

20% < ≤ 50%

> 50%

# RESULTS AND DISCUSSION



## CLEANLINESS: HIND QUARTERS(HQ)

FARM	12	13	14
<b>A</b>	4,22	<i>10,77</i>	9,53
<b>B</b>	<i>10,3</i>	6,13	<i>15,39</i>
<b>C</b>	8,6	0	<i>16,33</i>
<b>D</b>	<b>78,38</b>	<b>94,7</b>	<b>22,45</b>
<b>E</b>	8,6	4,35	<i>15,91</i>
<b>F</b>	<b>71,43</b>	<b>27,28</b>	<i>16,67</i>

Cleanliness HQ	$\leq 10\%$	$10\% < \leq 19\%$	<b><math>&gt; 19\%</math></b>
----------------	-------------	--------------------	-------------------------------



# RESULTS AND DISCUSSION



## CLEANLINESS: UDDER (U)

FARM	12	13	14
A	2,1	6,16	1,59
B	10,3	2,05	3,85
C	5,8	0	6,13
D	75,68	89,8	8,17
E	35,8	6,53	9,1
F	57,2	18,19	13,34

Cleanliness U	$\leq 10\%$	$10\% < \leq 19\%$	$> 19\%$
---------------	-------------	--------------------	----------

# RESULTS AND DISCUSSION



## HEAT DETECTION

FARM	Heat detection 12	Heat detection 13	Heat detection 14
<b>A</b>	64,16	<b>48,72</b>	54,56
<b>B</b>	63,55	58,86	66,23
<b>C</b>	75,04	64,32	66,86
<b>D</b>	64,69	<b>47</b>	<b>43,97</b>
<b>E</b>	74,46	74	70
<b>F</b>	59,46	64,69	60,91

# RESULTS AND DISCUSSION



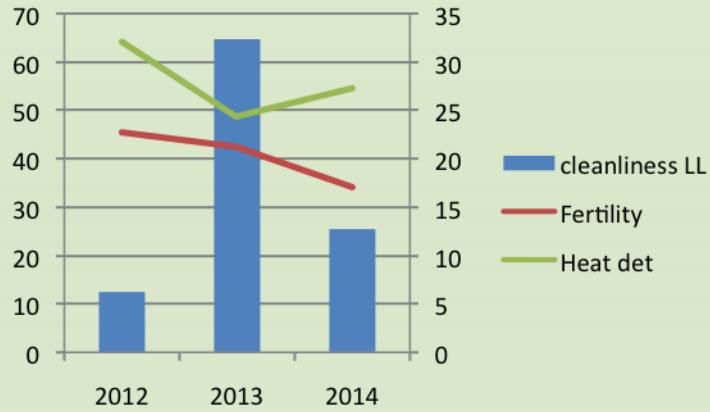
## FERTILITY

FARM	Fertility 12	Fertility 13	Fertility 2014
<i>A</i>	45,45	42,36	34,13
<i>B</i>	43,47	43,65	40,91
<i>C</i>	37,31	39,38	30,98
<i>D</i>	32,78	29	33,79
<i>E</i>	20	30	28
<i>F</i>	19,84	22,11	25,90

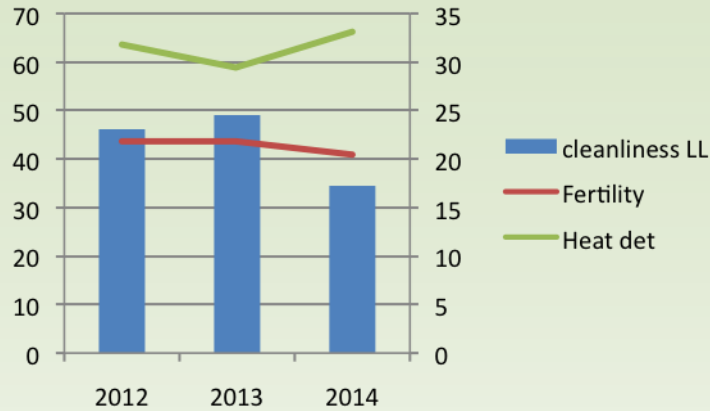


# CLEANLINESS LOWER LEG (LL)-FERTILITY-HEAT DETECTION

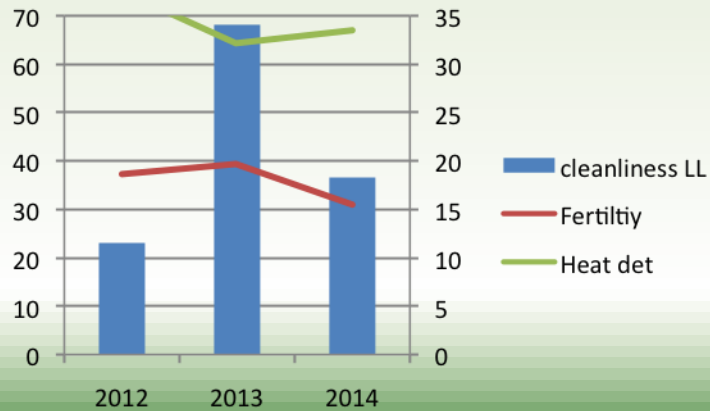
**A**



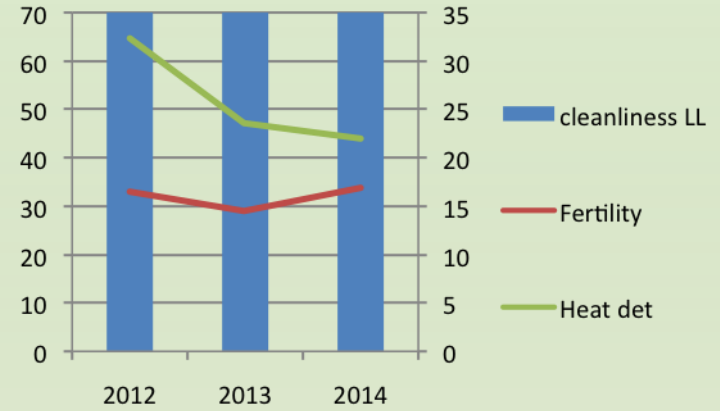
**B**



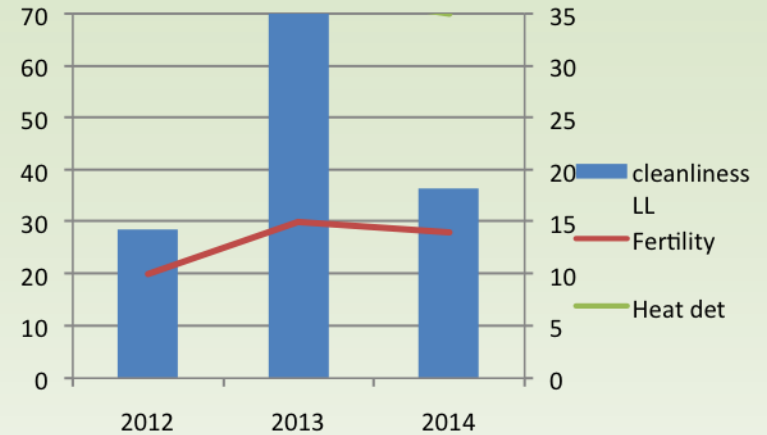
**C**



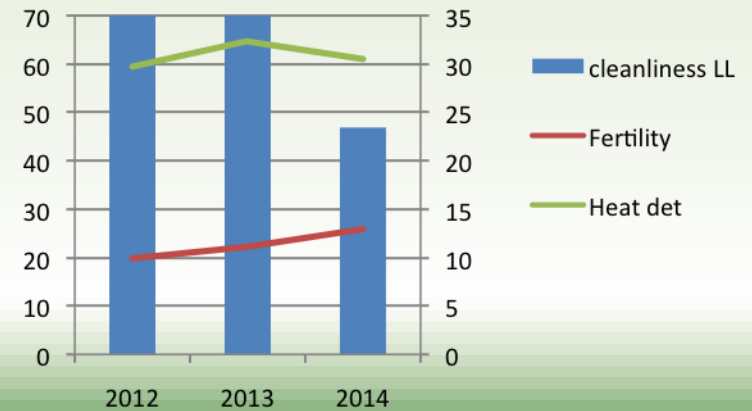
**D**



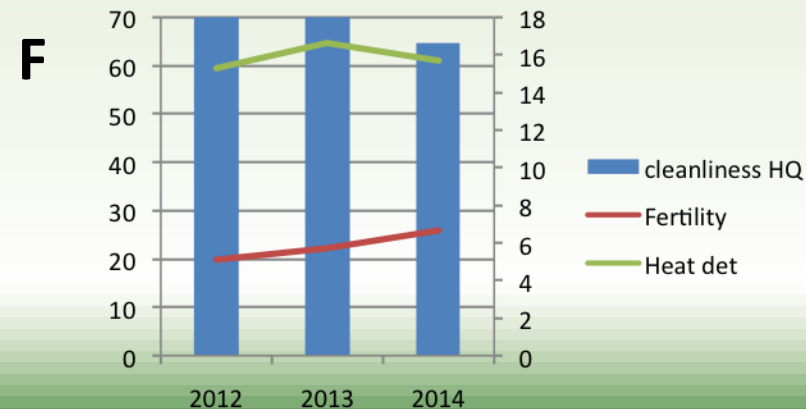
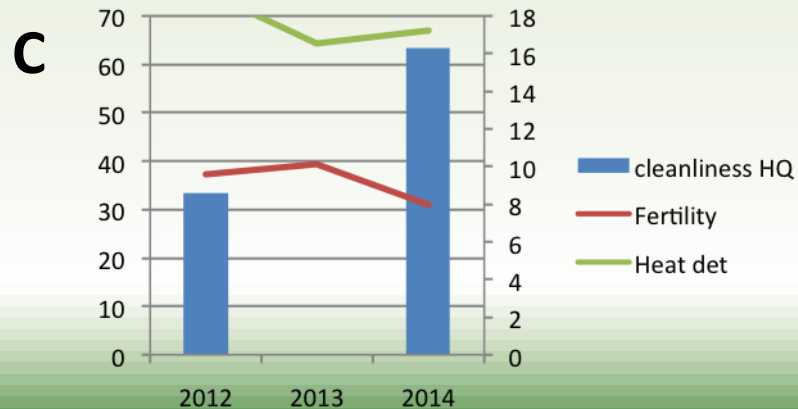
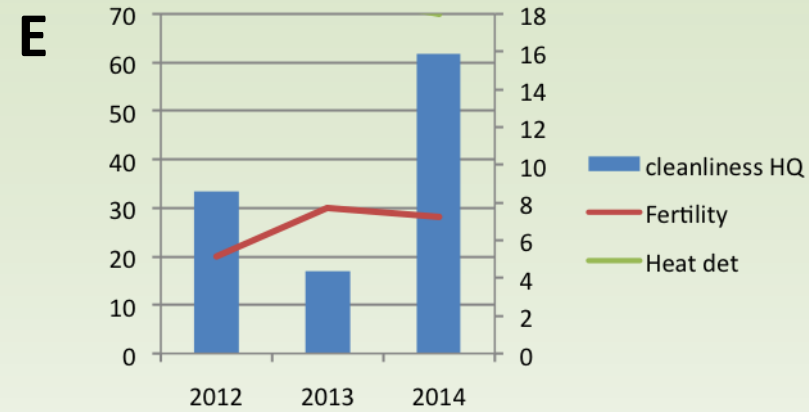
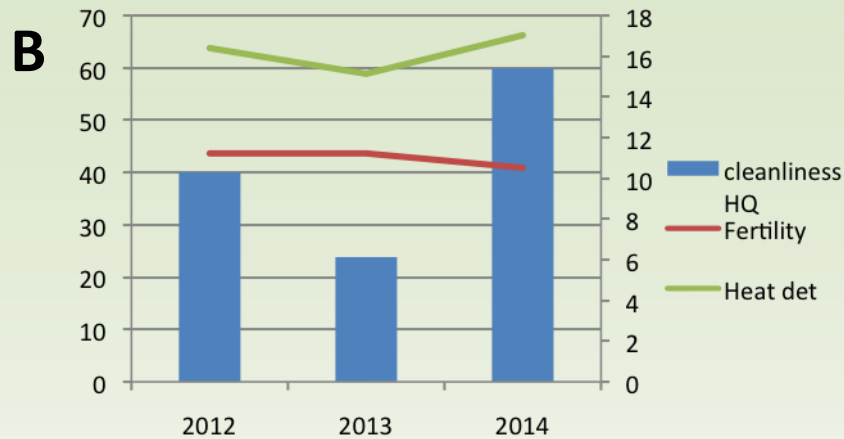
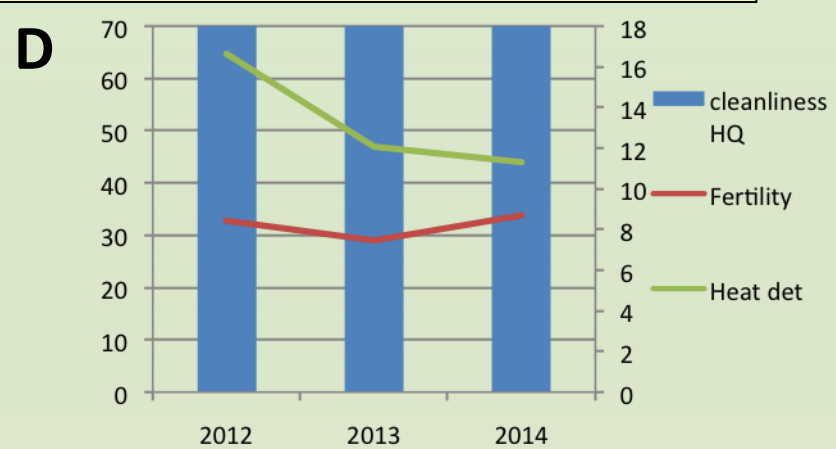
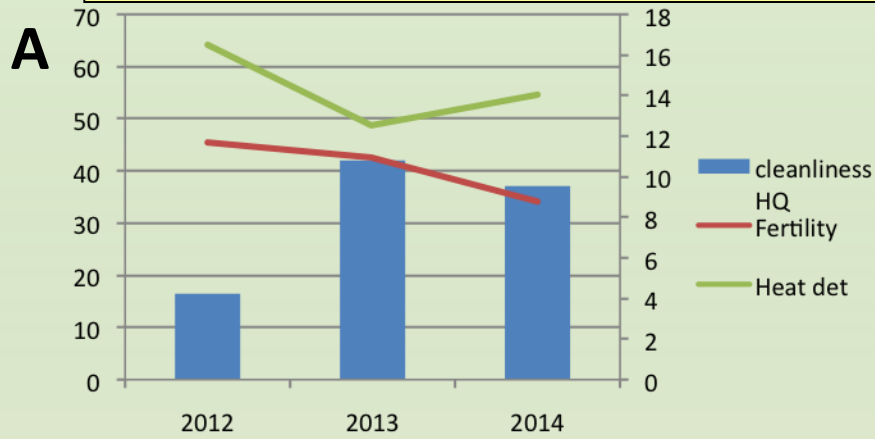
**E**



**F**

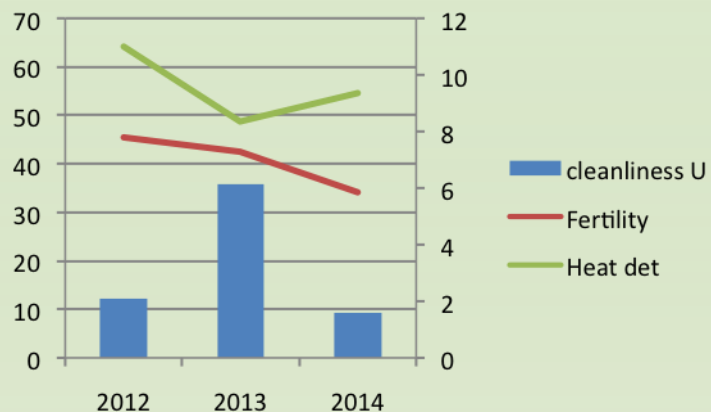


# CLEANLINESS HIND QUARTER (HQ)-FERTILITY-HEAT DETECTION

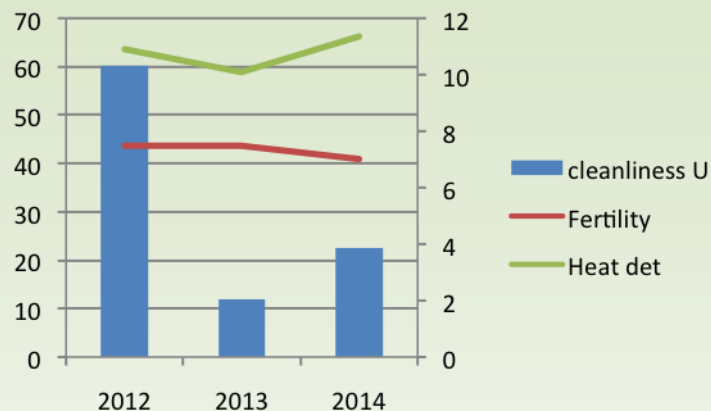


# CLEANLINESS UDDER (U)-FERTILITY-HEAT DETECTION

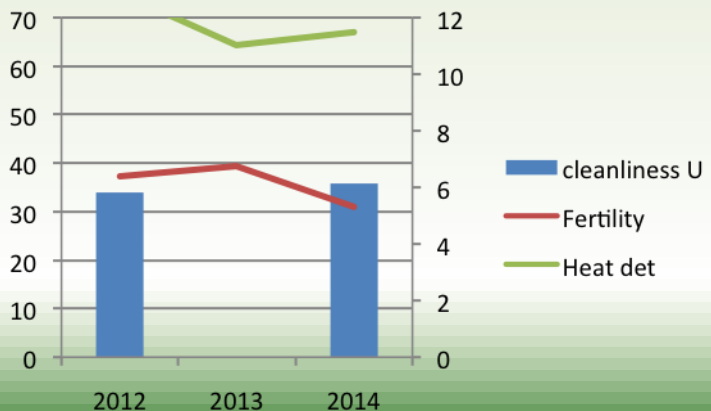
**A**



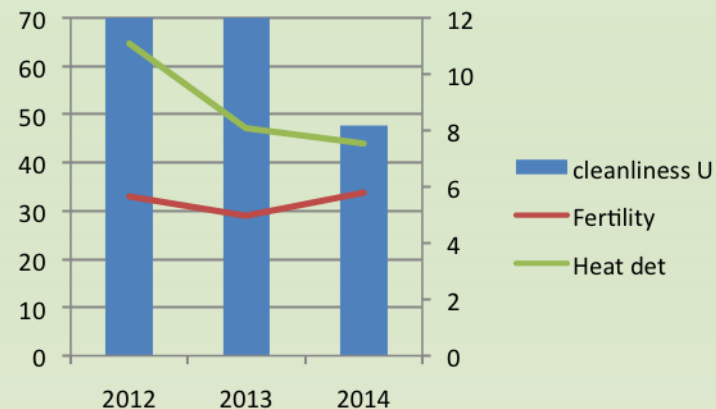
**B**



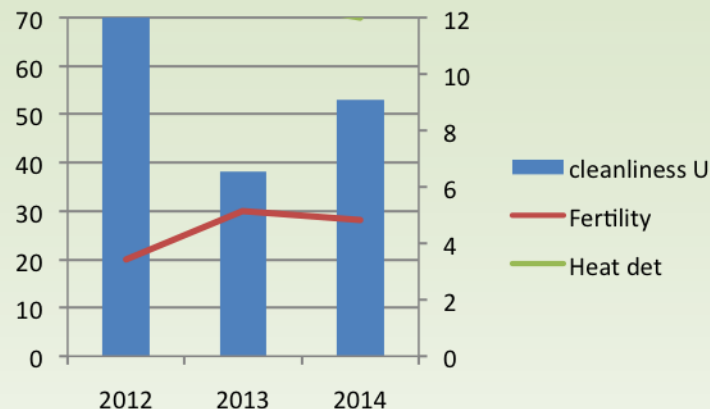
**C**



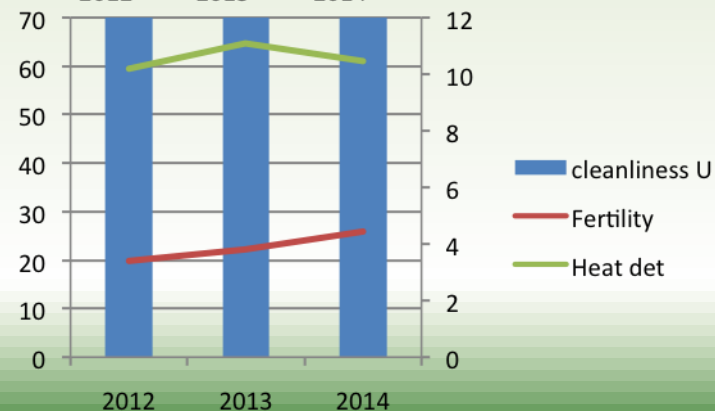
**D**



**E**

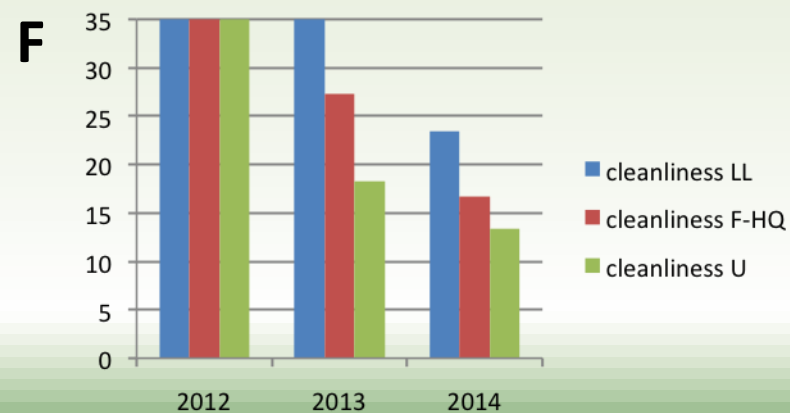
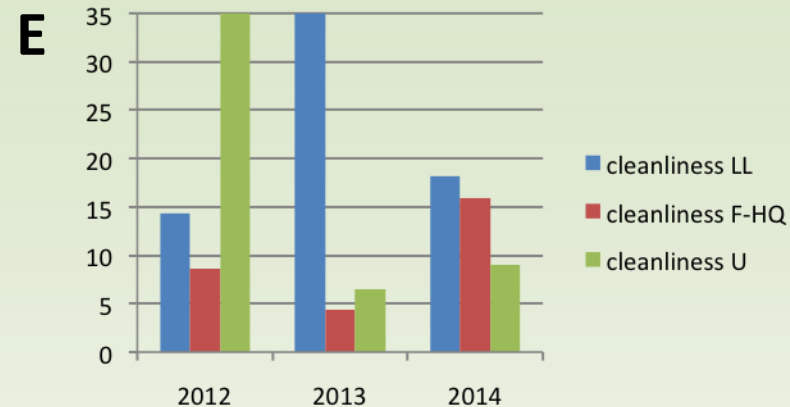
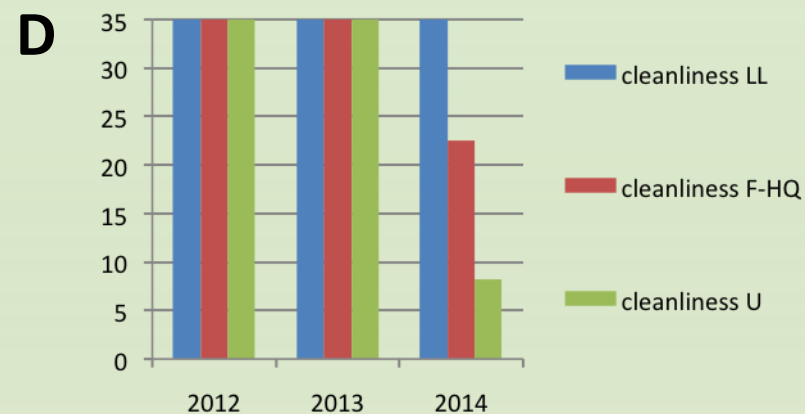
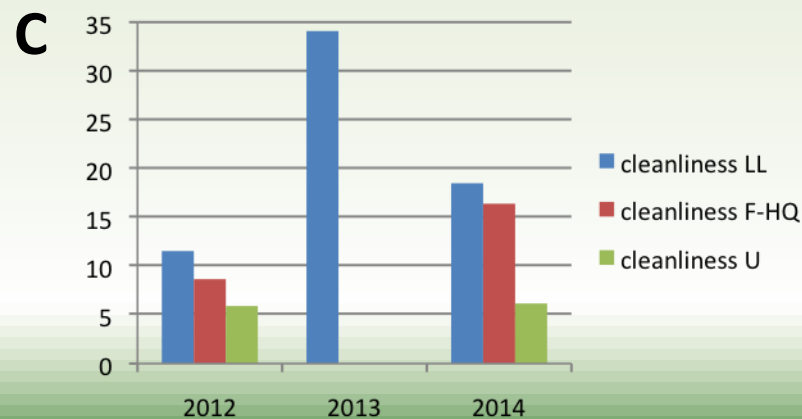
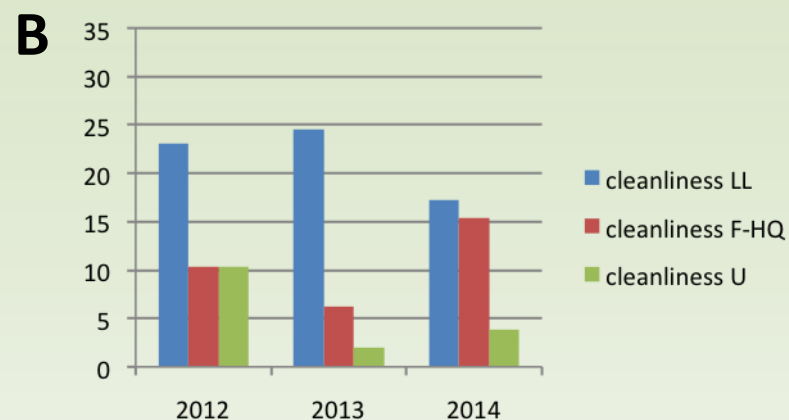
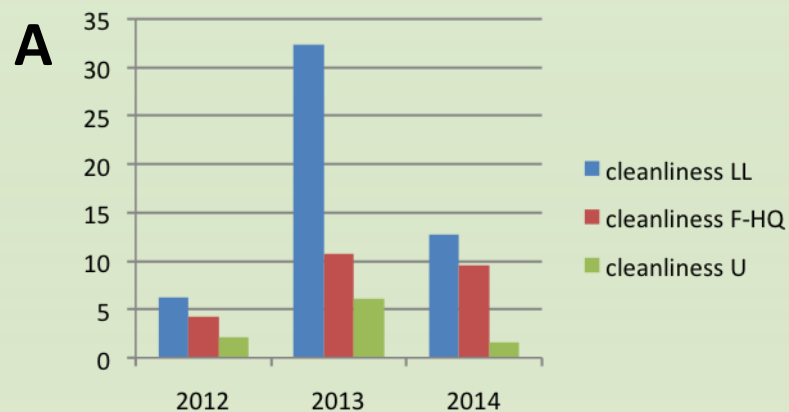


**F**

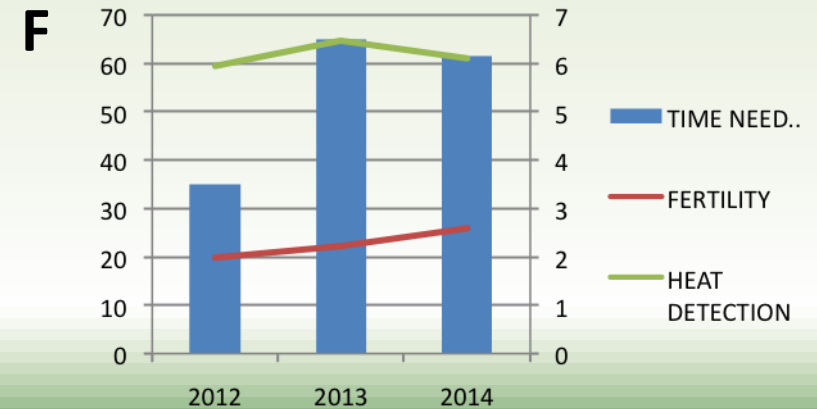
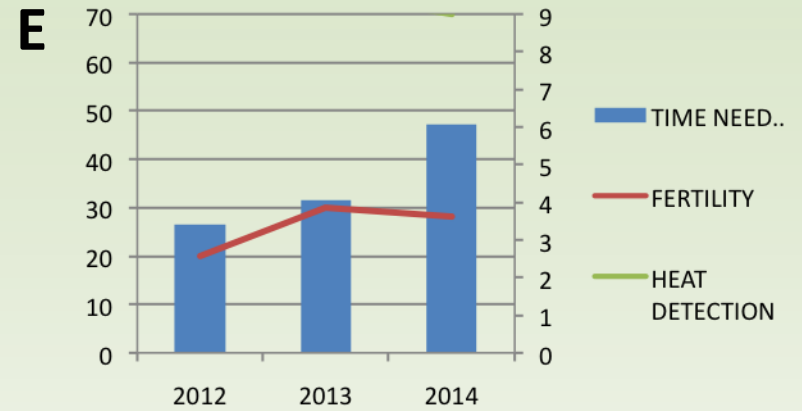
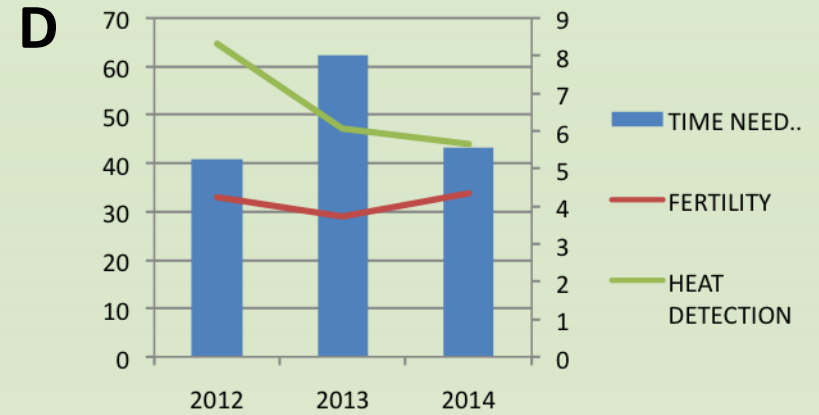
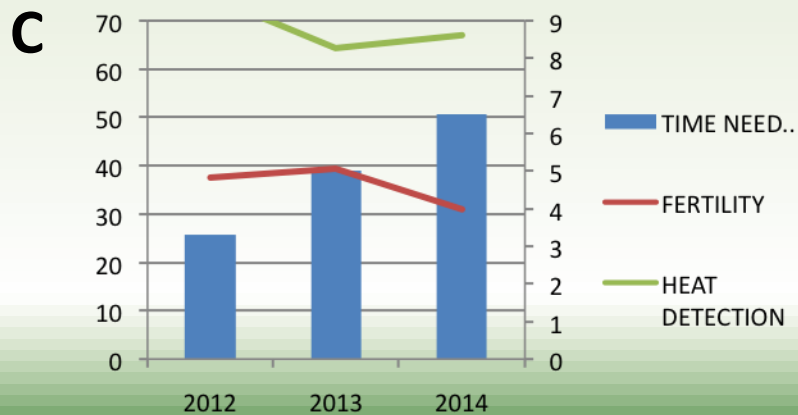
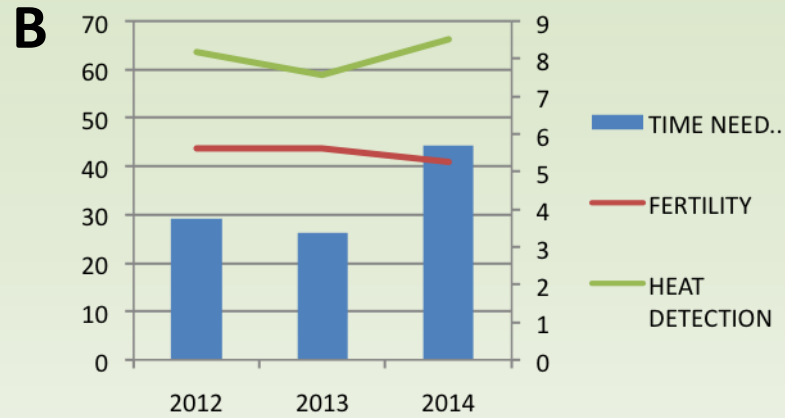
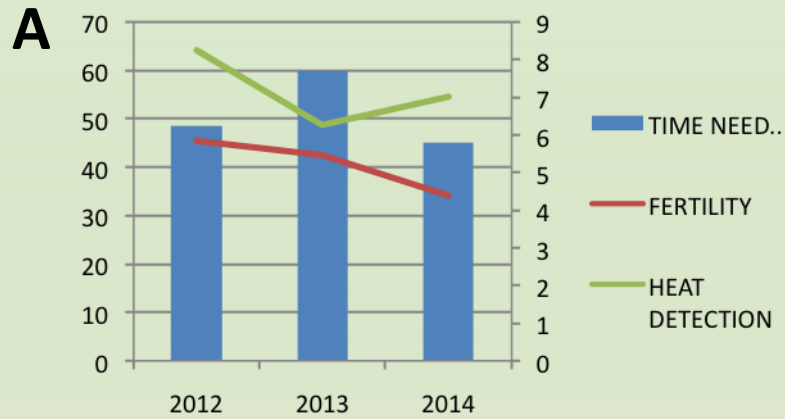




# RELATIONSHIP AND TENDENCY BETWEEN CLEANLINESS OF DIFFERENT PART

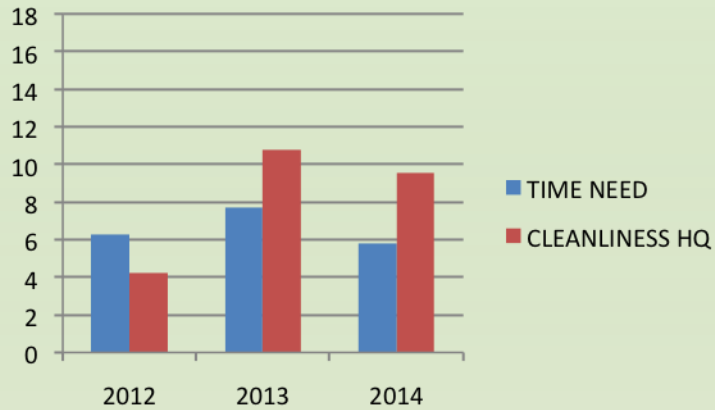


# TIME NEEDED TO LIE DOWN-FERTILITY-HEAT DETECTION

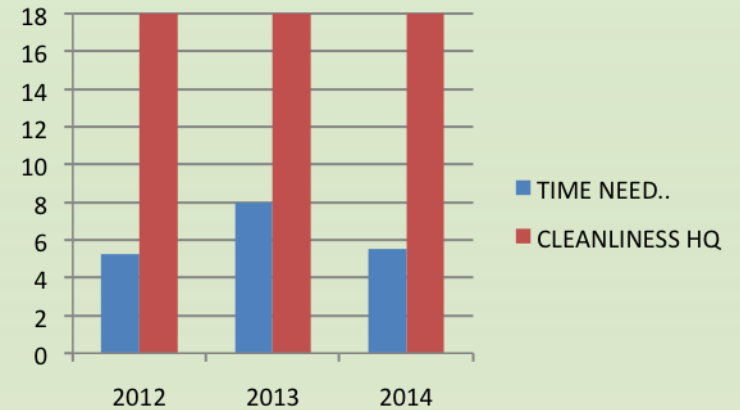


# TIME NEEDED TO LIE DOWN- CLEANLINESS HIND QUARTER

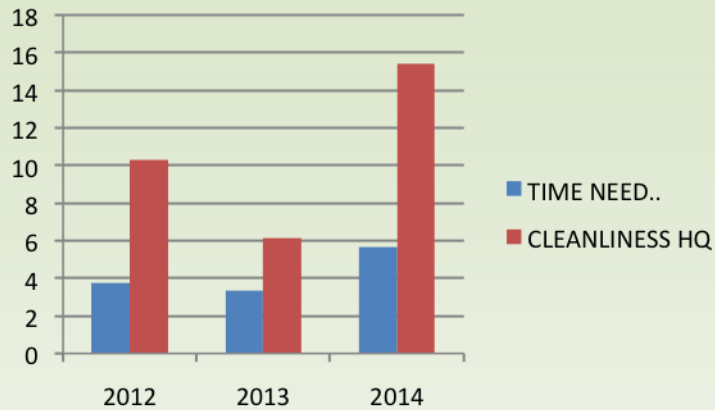
**A**



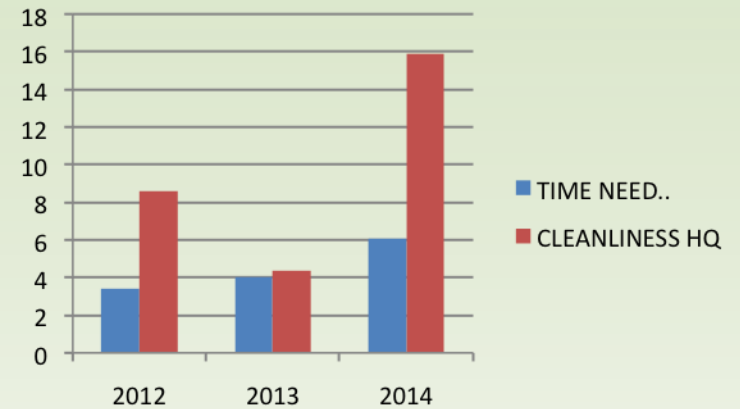
**D**



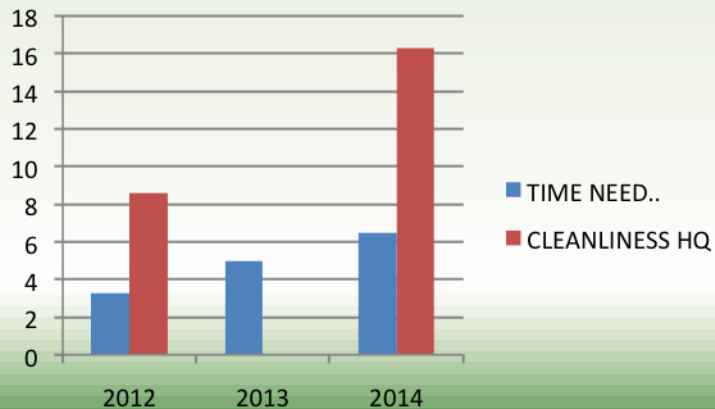
**B**



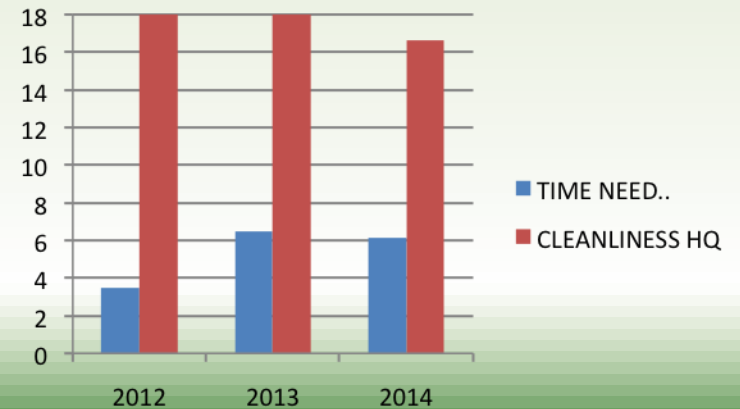
**E**



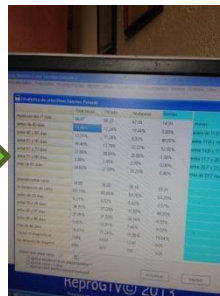
**C**



**F**



1. There is a relationship between time needed to lie down, cleanliness, heat detection and fertility, that is to say, there is a relationship between some welfare indicators and some reproductive index.
2. The cleanliness of hind quarters is associated with the time needed to lie down, and then could be an easier and quicker way to evaluate the comfort at farm level.
3. Preliminary results from 2012 to 2014 suggest that the welfare scores could affect on the reproductive index for the subsequent years.





A long, well-lit dairy barn with a high ceiling and blue metal beams. Rows of black and white cows are standing in metal stalls, eating hay from a long trough. Large fans are mounted on the ceiling. A blue thought bubble with the word "QUESTION?" is superimposed in the center of the image.

**QUESTION?**

**THANKS FOR YOUR ATTENTION**