



# EQUINE E-HEALTH:

## ALLFLEX ID CHIP FOR TEMPERATURE IN HORSES

**EQU'INSTITUT**

CLINIQUE DU PLESSIS  
CHAMANT, FRANCE







# E-HEALTH

## 馬 FASHION

- 馬 HUMANS
- 馬 ANIMALS

## 馬 OPPORTUNITY

- 馬 DATA COLLECTION
  - TYPE
  - NUMBER

## 馬 BETTER MEDICINE

- 馬 LEARN MORE
- 馬 PARAMETERS ANALYSIS
- 馬 PREVENTION





# E-HEALTH TOOLS

## 馬 MONITORING

- ☑ SMALL
- ☑ WIRELESS
- ☑ EASY TO HANDLE /USE
- ☑ READY TO WORK ANY CONDITIONS
- ☑ RELIABLE
- ☑ NON OR MINI-INVASIVE



## 馬 READER

- ☑ SMALL
- ☑ EASY TO USE
- ☑ FAST
- ☑ RECORDER







# E-HEALTH TOOLS

## 馬 DATA COLLECTION

- ☒ SOFTWARE
- ☒ APPLICATION

## 馬 DATA SHARING SYSTEM

- ☒ INTERNET
- ☒ CLOUD





# EQUINE E-HEALTH

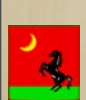
## 馬 EXISTING MONITORING

- ☒ HR : POLAR
- ☒ KMS / SPEED : GPS
- ☒ ECG : ALIVECOR
- ☒ ABP
- ☒ SPO2



## 馬 IN DEVELOPMENT

- ☒ LOCOMOTOR : GAIT ANALYSIS
- ☒ POSITION ANALYSER : STANDING/LYING
- ☒ MOVEMENT TRACKERS
- ☒ ECG ?
- ☒ SUPERFICIAL TEMP ?







# EQUINE MEDICINE

## 馬 EQUINE PATHOLOGIES

- ☒ LOCOMOTOR PROBLEMS
- ☒ INFECTIOUS DISEASES
- ☒ RESPIRATORY PROBLEMS
- ☒ ABDOMINAL PAIN (COLIC)
- ☒ EXERCISE INTOLERANCE

## 馬 EQUINE INDUSTRY

- ☒ PROFESSIONAL
  - TRAINERS
  - VETS
- ☒ SEMI-PROFESSIONAL
- ☒ LEISURE





# EQUINE TEMPERATURE

## 馬 WHAT WE KNOW

- ☒ NORMAL TEMPERATURE = GOOD HEALTH
  - HIGH = BAD
  - LOW = VERY BAD
- ☒ NORMAL = STABLE
- ☒ RANGE = 37,0 - 37,9°C
  - LITERATURE...!



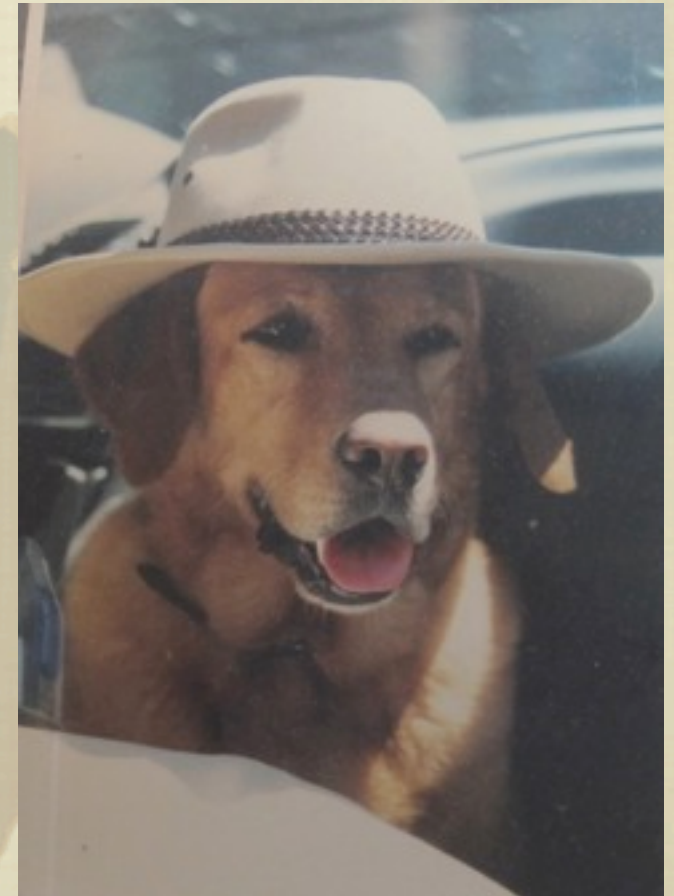




# EQUINE TEMPERATURE

## 馬 WHAT WE DON'T KNOW

- NORMAL VARIATIONS
  - AGE / BREED
  - DAY VARIATION
  - ACTIVITY
  - TRANSPORTATION
- INDIVIDUAL VARIATIONS
- GOOD INTERPRETATION
  - INCREASE / DECREASE
    - ◆ LEVEL
    - ◆ TIME
  - INDIVIDUAL / GROUP
    - ◆ STATUS
    - ◆ PREVENTION







# EQUINE TEMPERATURE

## 馬 FEVER

- ☒ DISEASES
  - INFECTION
  - INFLAMMATION
- ☒ PAIN
- ☒ EXERCISE
- ☒ STRESS
- ☒ MALIGNANT HYPERTHERMIA

## 馬 DECREASED TEMPERATURE

- ☒ SHOCK / DISTRESS
- ☒ HYPOTHERMIA
- ☒ GENERAL ANESTHESIA
- ☒ TREATMENT
- ☒ POST-EXERCISE ?





# EQUINE TEMPERATURE

## 馬 FEVER = FIRST SIGN OF

- ☒ INFECTIOUS DISEASES
  - INFLUENZA
  - HERPES VIRUS
  - STRANGLES
  - BACTERIEMIA
    - ◆ LOCAL / GENERAL
- ☒ PHYSIOLOGICAL BODY RESPONSE
  - INFLAMMATION / PAIN
  - METABOLIC RESPONSE

## 馬 SIGNS OF FEVER... BUT NOT FIRST

- ☒ DECREASED APPETITE / ANOREXIA
- ☒ DULLNESS / HEAD DOWN
- ☒ DECREASED MOVEMENTS







# T° MEASUREMENT IN HORSES

## 馬 RECTAL TEMPERATURE

### ACTUAL REFERENCE

- DANGEROUS
- DIRTY
- TIME CONSUMING
  - ◆ MINI 1.30 MIN/ HORSE
  - ◆ 2 TO 3 TIMES A DAY
  - ◆ +- 2 PERSONS !
- TECHNICIAN DEPENDANT
  - ◆ RELIABILITY ?

### USES

- CHECK PROBLEMS
- PROBLEMS FOLLOW UP
- INDIVIDUAL VS GROUP
- RARELY IN PREVENTION...





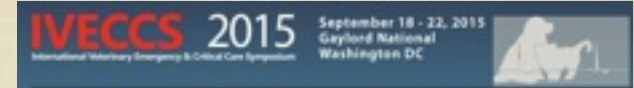



# T° MEASUREMENT IN HORSES

## SUPERFICIAL SKIN TEMPERATURE

### CLINICAL STUDY 2014

### MEASUREMENT OF SKIN BODY TEMPERATURE AS AN ALTERNATIVE TO RECTAL TEMPERATURE IN HORSES



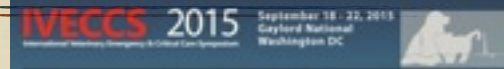
 THE AIM OF THIS STUDY WAS TO LOOK IF A RELIABLE CORRELATION BETWEEN SUPERFICIAL SKIN AND RECTAL TEMPERATURES EXISTS, IN ORDER TO EVALUATE A SIMPLER, FASTER, ECONOMICAL AND LESS DANGEROUS METHOD TO FOLLOW BODY TEMPERATURE IN HORSES.







# T° MEASUREMENT IN HORSES



馬 RECTAL AND SUPERFICIAL SKIN TEMPERATURES OF 12 NORMAL HORSES

馬 6 SH, 3 STD, 3 THB WERE COMPARED THROUGHOUT 6 MONTHS (MARCH-SEPTEMBER 2014) AND 1 YEAR (MARCH 2014-MARCH 2015).

馬 TEMPERATURES WERE MEASURED WITH :

- 馬 DIGITAL THERMOMETER (®PELIMEX SA F67) FOR RECTAL VALUES
- 馬 INFRA RED LASER THERMOMETER (®VOLT CRAFT IR-380°) FOR SUPERFICIAL SKIN VALUES
- 馬 ELECTRONIC INSIDE/OUTSIDE EXTERNAL THERMOMETER (®OTIO EM713P) FOR AMBIENT TEMPERATURE VALUES.

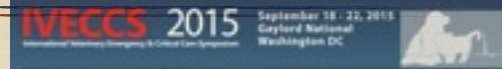
馬 FOR EACH HORSE , TEMPERATURE S MEASUREMENTS (°C) WERE TAKEN IN ITS BOX, EVERY MORNING BETWEEN 8.30 AND 9.30 AM. EVERY SPECIAL CONDITIONS WERE RECORDED WHEN NEEDED (BLANKET RETRIEVAL, BACK FROM OUTSIDE...).





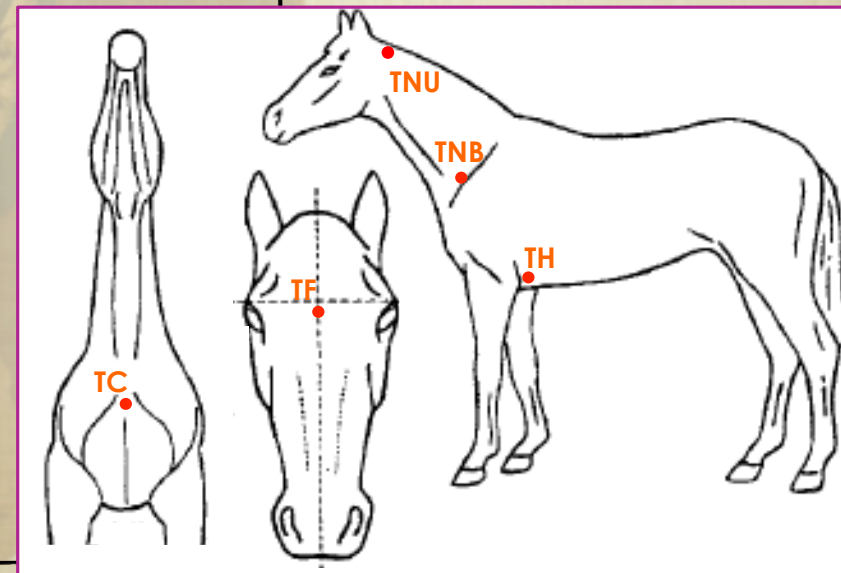
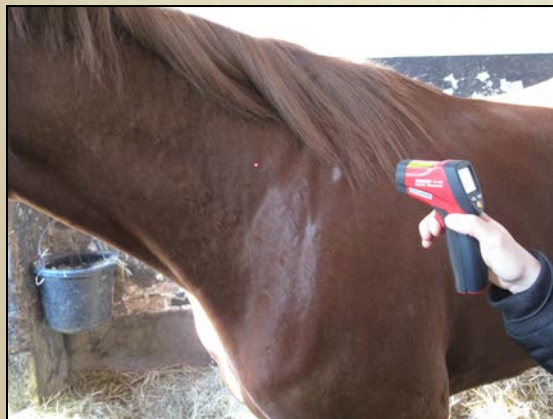


# T° MEASUREMENT IN HORSES



RECTAL TEMPERATURE (TR) WAS RECORDED AFTER A DOUBLE CHECK. AMBIENT TEMPERATURE (TA) WAS RECORDED INSIDE THE BOX. DATA FROM SKIN TEMPERATURE WERE COLLECTED FROM 5 SPECIFIC SUPERFICIAL AREAS OF THE HORSE :

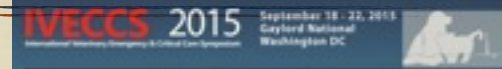
- ☒ TF = FRONTAL BONE (HEAD)
- ☒ TC = CHEST (PECTORAL MUSCLES)
- ☒ TNU = UPPER LEFT 1/3 RD OF THE NECK (MICROCHIP POSITION)
- ☒ TNB = LEFT NECK BASIS (IM INJECTION SITE)
- ☒ TH = LEFT HEART POSITION (6TH LEFT INTERSCOSTAL SPACE, POINT OF ELBOW)







# T° MEASUREMENT IN HORSES



## RESULTS



486 RECORDS WERE COLLECTED DURING THE PERIOD MARCH 2014 TO SEPTEMBER 2014, AND 1077 FROM MARCH 2014 TO MARCH 2015, PROVIDING 3451 AND 7539 TEMPERATURE VALUES.



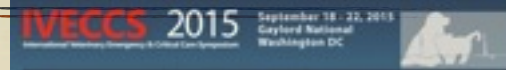
ALL READINGS, EXCEPT TR VARIED WITH TA BUT TNU AND TF WERE THE LESS INFLUENCED BY AMBIENT TEMPERATURE AND SO THE MORE CORRELATED TO TR. CALCULATED DIFFERENCES [TR-TF ] AND [TR-TNU] WERE THE LOWEST ONES,  $11 \pm 2,67 (10,3)$  AND  $9,73 \pm 3,65 (8,9)^{\circ}\text{C}$  RESPECTIVELY FOR THE WHOLE YEAR.

M +- SD (Med)	March 2014- Sept 2014	March 2014- March 2015
<b>Records</b>	486 // 3451 values	1077 // 7539 values
<b>TA</b>	20,77°C +-0,37(22,6)	16,58°C +- 6,95(17)
<b>TR</b>	37,49 °C +-0,22 (37,5)	37,46°C +-0,28(37,4)
<b>TF</b>	28,58 °C +-0,68(27,9)	26,46°C +-2,69(27,3)
<b>TC</b>	31,22 °C +-0,51 (31,4)	31,39°C +-1,95(31,4)
<b>TNU</b>	30,53 °C +-1,18 (30,7)	27,69°C +-3,64(28,5)
<b>TNB</b>	31,01 °C +-0,54 (31,1)	28,74°C +-3,40(29,7)
<b>TH</b>	31,62 °C +-0,48 (31,7)	31,71°C+-2,05(31,7)

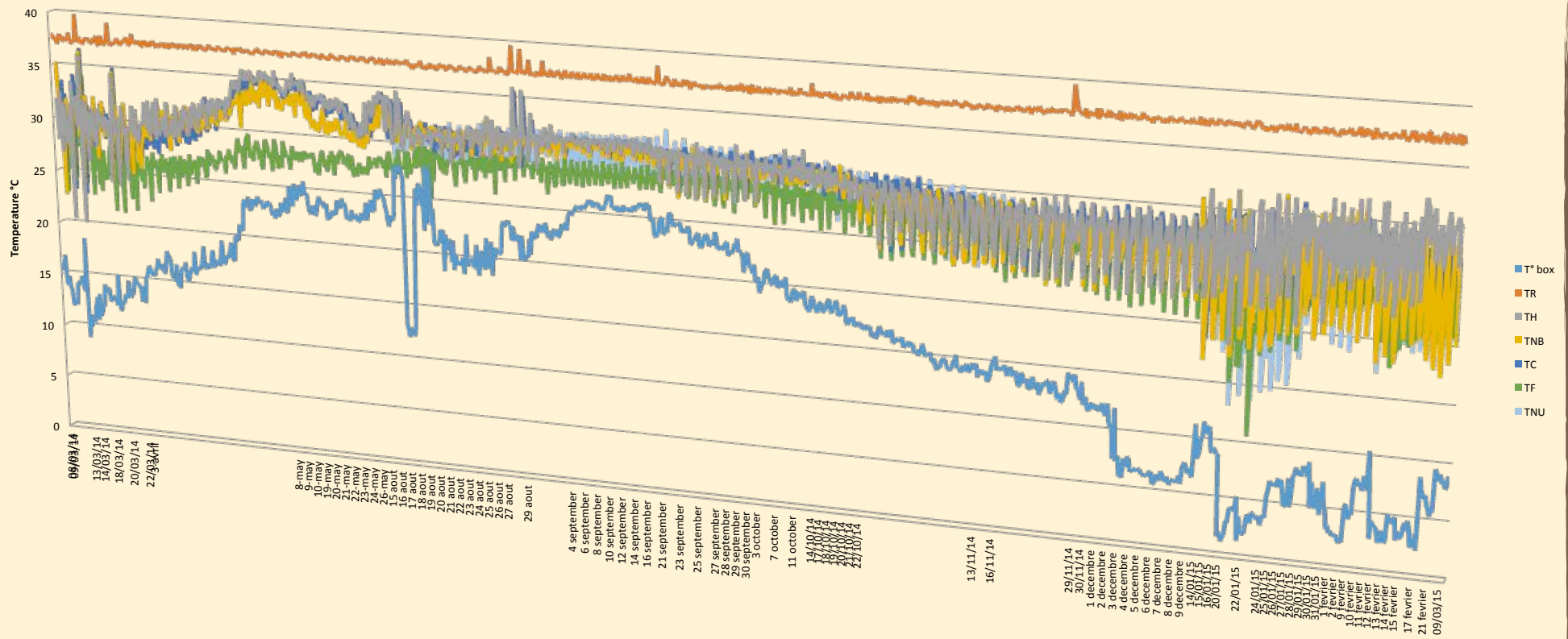




# T° MEASUREMENT IN HORSES



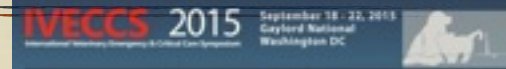
Temperatures Evolution



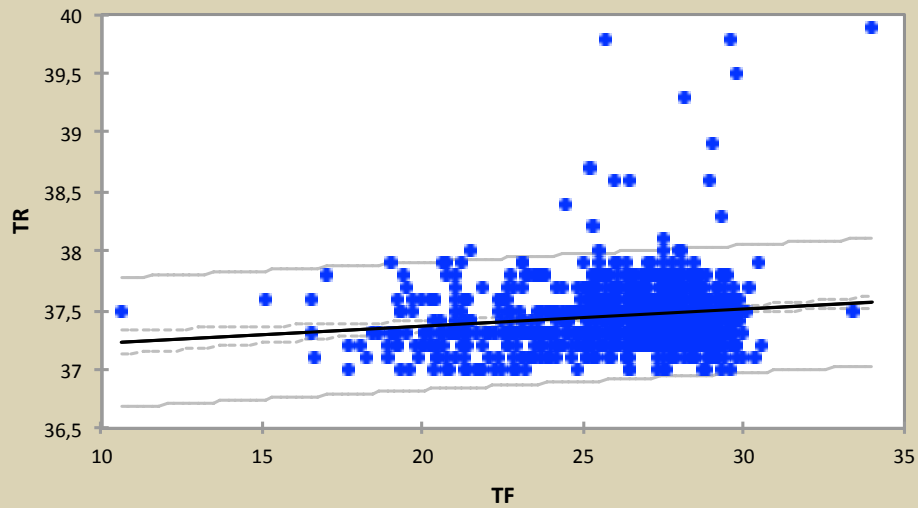




# T° MEASUREMENT IN HORSES

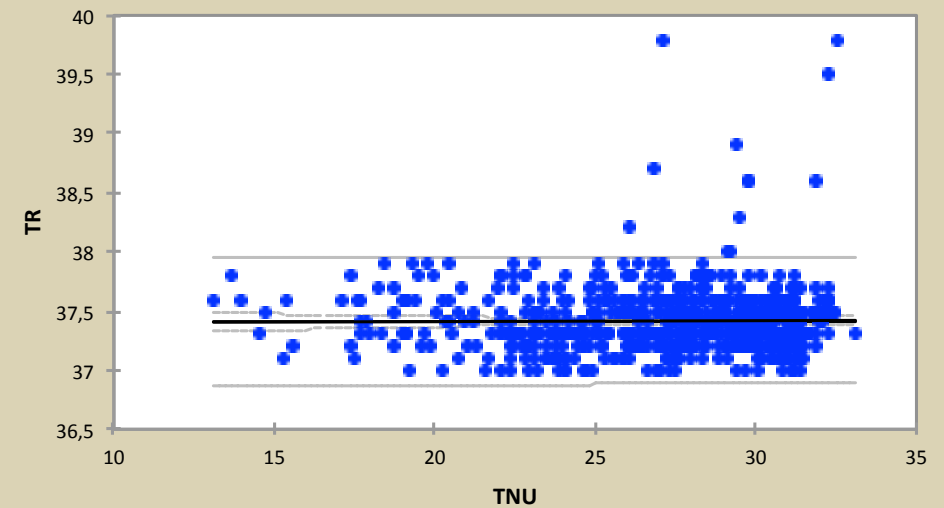


Régression de TR par TF ( $R^2=0.020$ )



● Actives      ———— Modèle  
- - - - - Int. de conf. (Moyenne 95%)      ———— Int. de conf. (Obs. 95%)

Régression de TR par TNU ( $R^2=0.000$ )

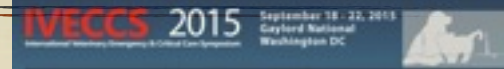


● Actives      ———— Modèle  
- - - - - Int. de conf. (Moyenne 95%)      ———— Int. de conf. (Obs. 95%)





# T° MEASUREMENT IN HORSES



## 馬 CONCLUSION

馬 MORE DATA SHOULD BE COLLECTED AND INTERPRETED IN MORE SPECIFIC CONDITIONS (OUTSIDE EXTREME TEMPERATURES, SICK HORSES WITH FEVER), BUT INFRA RED SUPERFICIAL SKIN MEASUREMENTS IN THE NECK (MICROCHIP SITE PLACEMENT - LEFT SIDE UPPER NECK) AND HEAD (FRONTAL BONE - LIKE IN MEN) SHOULD BE CONSIDERED AS AN EASY AND SAFE ALTERNATIVE TO RECORD HORSE'S BODY TEMPERATURE IN PRACTICE.







# EQUINE MICROCHIPS

## 馬 IDENTIFICATION OF HORSES

### ☒ EUROPEAN HORSE'S BOOK

- STUD BOOKS
- DESCRIPTION
- DRAWINGS
- DRUG TRACEABILITY

### ☒ MICROCHIPS

- EASY
- UNIQUE
- DATABASE
  - ◆ CLOUD
  - ◆ EUROPE?







# EQUINE TEMP CHIP

## 馬 TEMPERATURE

- ☒ INSIDE MONITORING
- ☒ ALREADY IN FOR ID
- ☒ EASY / SAFE / CLEAN
- ☒ READY
- BIOTHERMO
- ☒ RELIABILITY ?







# EQUINE TEMP CHIP

## 馬 RELIABILITY

- LATEST VERSION
- NEEDLE LENGTH
- IM CHIP POSITION
- ◆ INSTRUCTIONS





# EQUINE TEMP CHIP

## 馬 CHIP IMPLANTATION







# EQUINE TEMP CHIP

## 馬 MEASUREMENT





# EQUINE TEMP CHIP

## 馬 RELIABILITY

- 4 HORSES
- 210 RECORDS
- ANALYSIS
  - ◆ HORSE / HORSE
  - ◆ ALL DATA



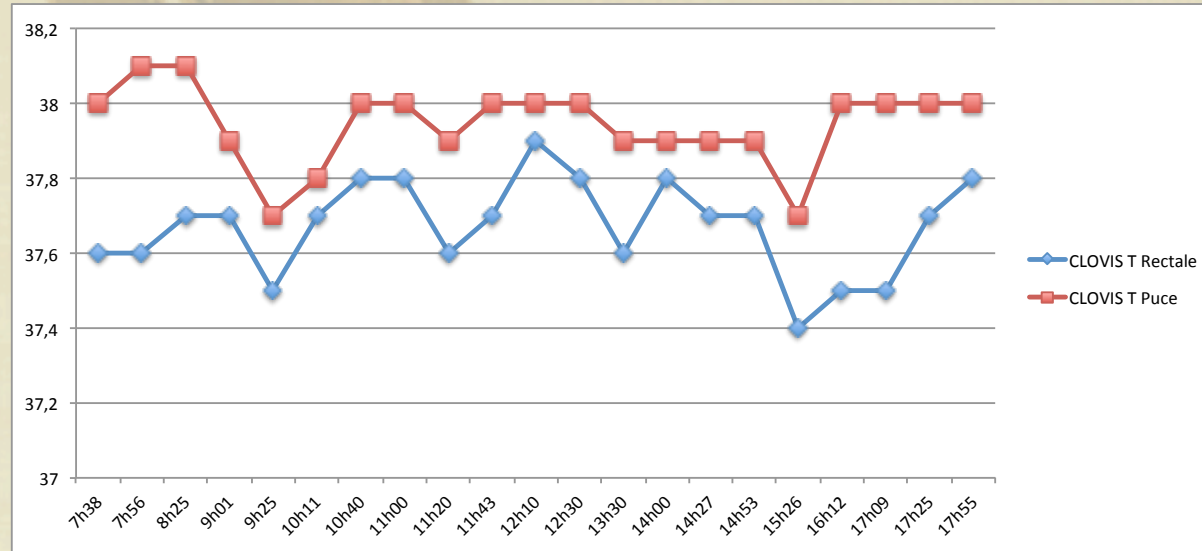




# EQUINE TEMP CHIP

## 馬 RELIABILITY HORSE / HORSE

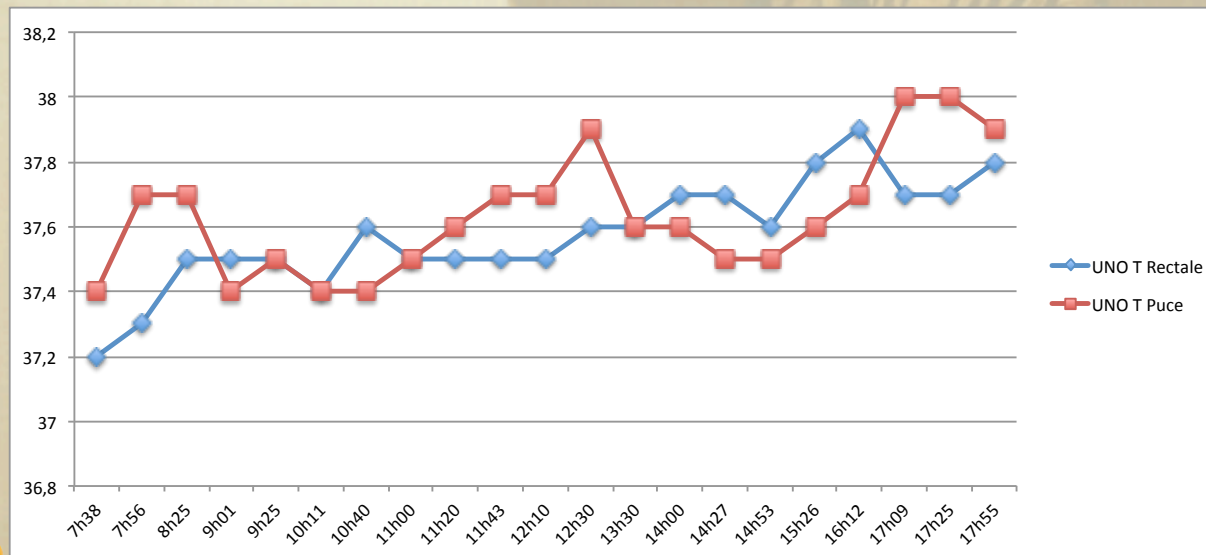
### 車 CLOVIS



**moy**  
37,671    37,943  
**sd**  
0,127    0,108

**moy diff**  
-0,08  
**sd diff**  
0,147

### 車 UNO



**moy**  
37,640    37,776  
**sd**  
0,194    0,246

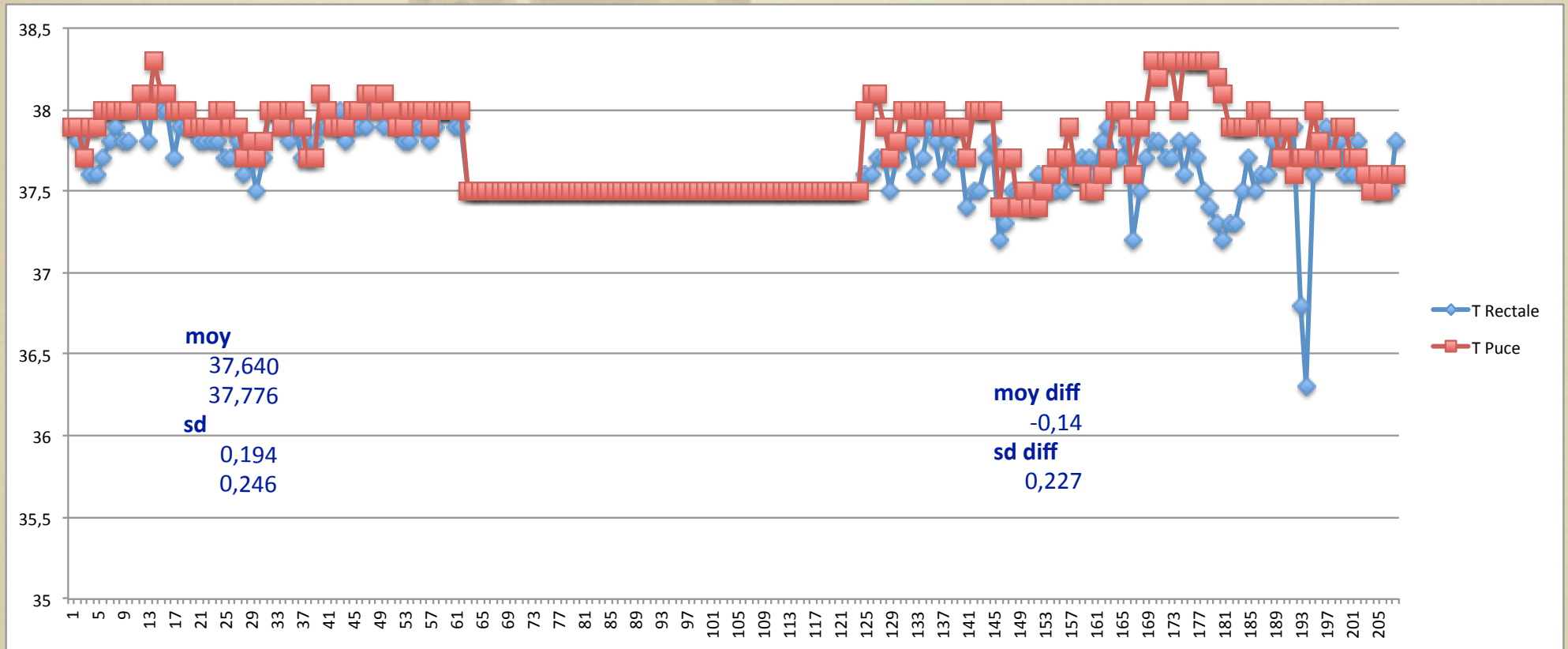
**moy diff**  
-0,14  
**sd diff**  
0,227





# EQUINE TEMP CHIP

## 馬 RELIABILITY ALL DATA







# EQUINE TEMP CHIP



## OBJECTIVES

- DATA COLLECTION
- SURVEILLANCE
- EDUCATION
- LEARNING



## EXPECTATIONS

- INCREASED LEVEL EQUINE HEALTH
  - ◆ COLLABORATIVE HEALTH / WELFARE
- EX : ANESTHESIA MONITORING





# EQUINE TEMP CHIP

## ANESTHESIA MONITORING EXPERIENCE

### HORSES - CS, AVA 1995

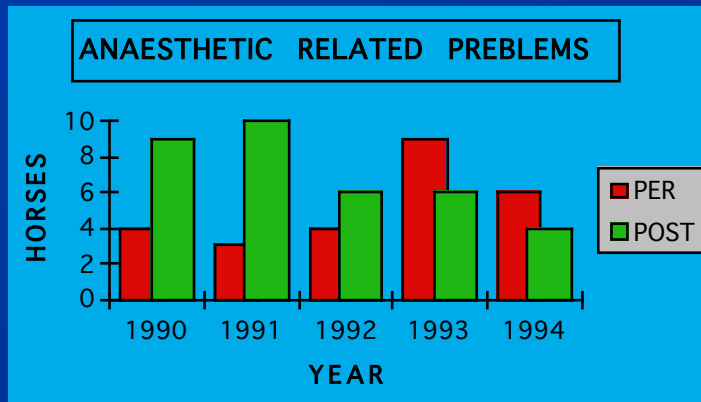
## MONITORING

- IBP, ABG
- SPO2, T°, NIBP
- INH GAZES

## RISQUES EN ANESTHESIE EQUINE

### ANAESTHETIC RELATED PROBLEMS

AVA 1995, LIVERPOOL

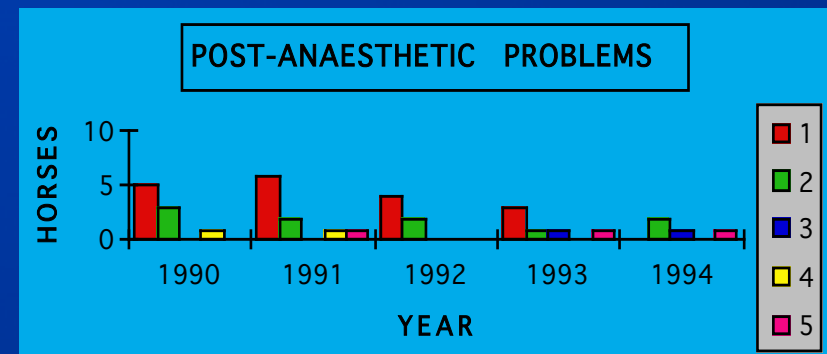


- less PoARP with time
- more PeARP with time
- more complicated surgeries with time

## RISQUES EN ANESTHESIE EQUINE

### POST-ANAESTHETIC PROBLEMS

AVA 1995, LIVERPOOL



- 1 : myopathy
- 2 : neuropathy
- 3 : neurologic problem
- 4 : fracture in recovery
- 5 : caecal impaction

- less myopathy
- less fractures







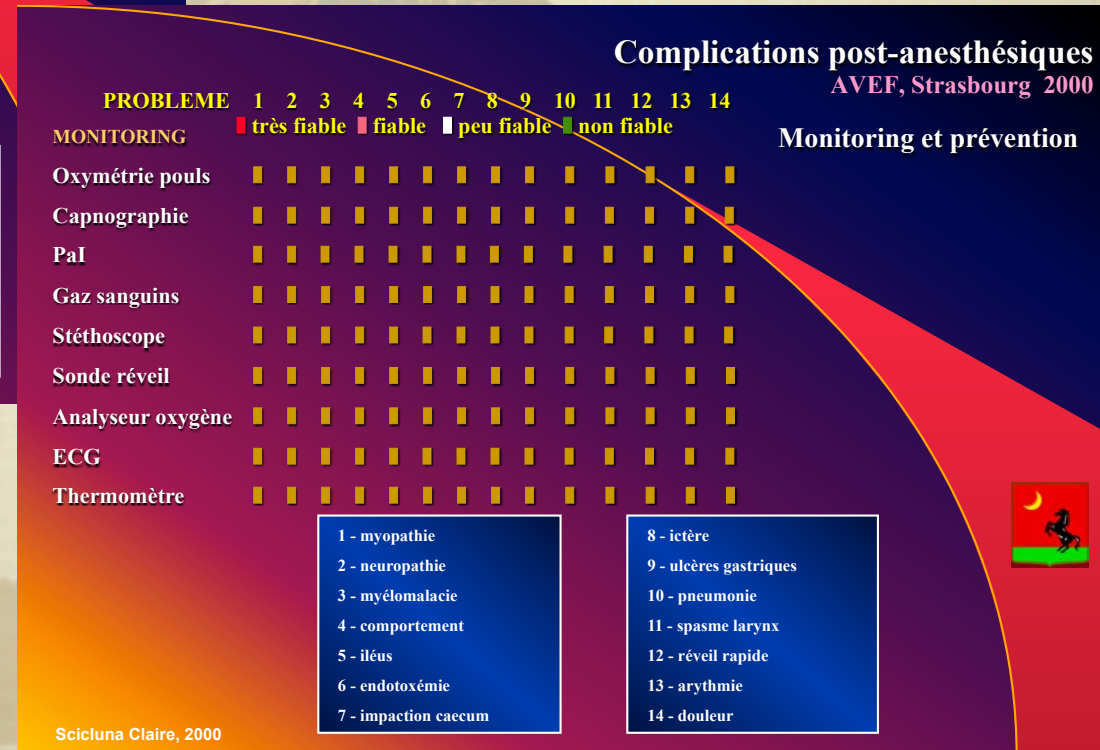
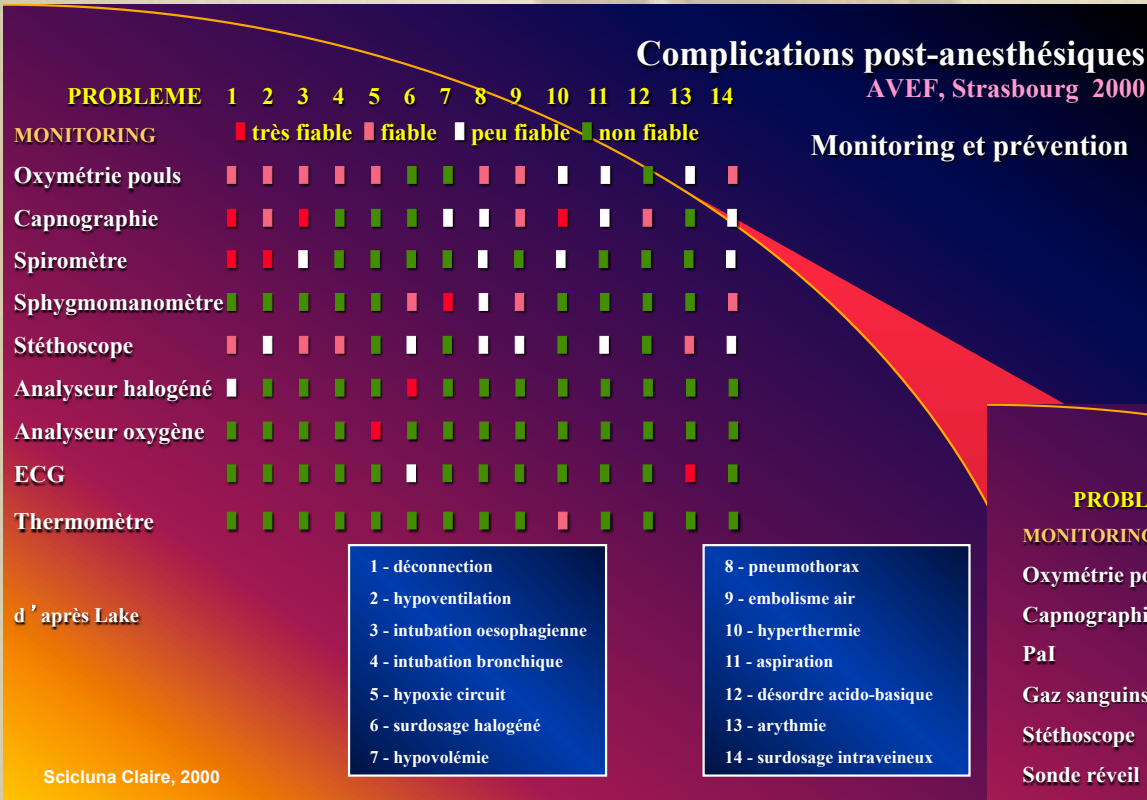
# EQUINE TEMP CHIP



## ANESTHESIA MONITORING EXPERIENCE



### HUMANS





# EQUINE TEMP CHIP

## 馬 TOOL FOR FUTURE

### ☒ TRAINERS

- TRAINING FOLLOW UP
- TREATMENT FOLLOW UP
- PREVENTION

### ☒ OWNERS

- PREVENTION

### ☒ VETS

- DISEASES
- EXERCISE INTOLERANCE / PREP
- ANESTHESIA
- TREATMENT / DRUGS FOLLOW UP
- CLINICAL RESEARCH
- AM TREATMENT STOP
- ....
- PREVENTION & WELFARE

