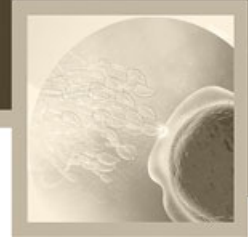
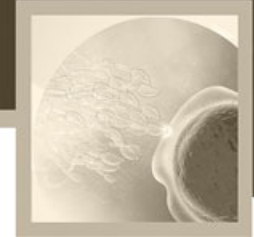


# SQA-Vt

New technology for  
increasing profits in the  
turkey industry

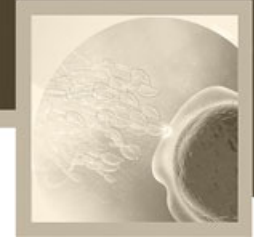


## Advantages of using the SQA-Vt



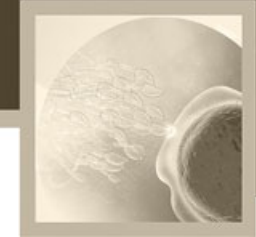
- **Accurate and reliable test results**
- **Easy to use and cost effective**
- **Consistent and standardized dose preparation**
- **Maximize # and quality of AI doses**
- **Flock optimization**
- **Comprehensive flock management**

## ADVANTAGES to using the SQA-Vt



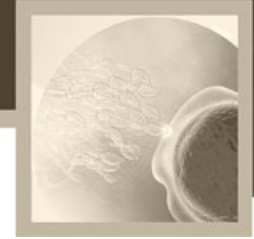
- **FERTILITY:** Use of the SQA-Vt can decrease the number of males used in the donor pool while maintaining the same fertility rates
- **QUALITY CONTROL:** The impact of such factors as age, disease, extenders and sperm collection and handling techniques have on fertility can be easily measured

# The VALUE of using the SQA-Vt



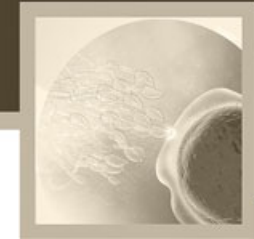
- **Optimal use of sperm from males with favorable genetic traits insures offspring with similar traits**
  - High weight males = High weight offspring
  - Increased body weight = Increased income of 100,000 Euro per million males
- **Removal of non-productive males from the donor pool**
  - Decrease in parent stock = Savings of 30,000 Euro as a result of decreased maintenance (feeding) expenses

# Objectives of this presentation



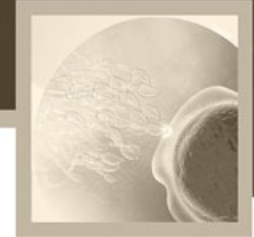
- **Present a general overview of the SQA-Vt and its technology**
- **Provide clinical evidence to prove the efficacy and positive impact of the SQA-Vt**
- **Present an economic cost / benefit model**

# Advancements in Turkey Artificial Insemination



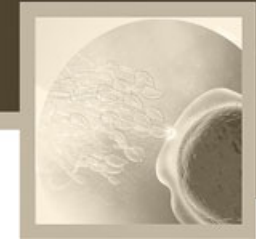
- **AI is used 100 % in the turkey industry**
- **Systems for filling straws have improved**
- **Sperm extenders preserve sperm for longer periods of time**
- **Improved filters are used for sperm collection**
- **New guidelines established for AI are focused on both the quantity of sperm required and the frequency of insemination**
- **Currently there is no QC methods in place for testing turkey sperm on an industrial scale**

# Innovations in other industries for comparison



- **Bull (dairy)**
  - AI is conducted with a routine QC program in place
  - Straws are prepared for AI with a standard number of sperm cells in a standard dose quantity
- **Bull (Breeding Soundness)**
  - Males with high fertility potential are identified and selected
- **Boars**
  - AI is routine with fresh or cooled semen
  - QC is conducted on samples prepared for AI
  - Straws are prepared for AI with a standard number of sperm cells in a standard dose quantity

## Results of standardized dose preparation and QC

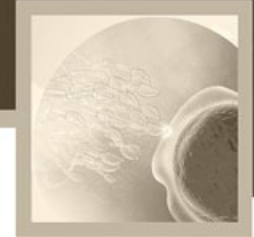


**WHEN.....**

- The **QUALITY** of the sperm goes **UP**
- The **NUMBER** of sperm cells per dose goes **DOWN**
- **STANDARDIZATION + QC = INCREASED \$ PROFITS**

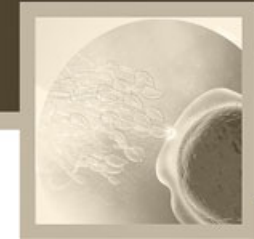


# What does the turkey industry require?



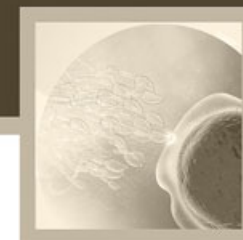
- **Profitability in the poultry industry is based on high throughput**
- **To effectively introduce sperm quality testing the procedure must be:**
  - Cost effective
  - Fast with no extra burden on the employees
  - Simple and user friendly
  - Reliable - results should be repeatable and accurate
  - Easy and adaptable to field conditions

# The SQA-Vt



- **Fast and simple to use – results within 45 seconds**
- **Reliable – high repeatability and accuracy**
- **Test results include both sperm concentration and motility**
- **Visualization system**
- **T-Sperm Software for flock and data management**
- **Auto-calibrating**
- **PC compatible**

# SQA-Vt Automated Testing/Dosing



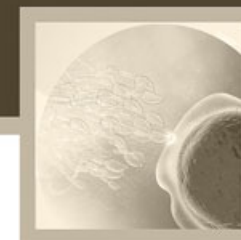
## SQA-Vt Semen Analysis Parameters

|                                   |                        |
|-----------------------------------|------------------------|
| <b>Total Sperm Concentration</b>  | <b>TSC (Bill / ml)</b> |
| <b>% Motility</b>                 | <b>%</b>               |
| <b>Motile Sperm Concentration</b> | <b>MSC (Bill / ml)</b> |
| <b>Total Sperm</b>                |                        |
| <b>Total Motile Sperm</b>         |                        |

## SQA-Vt Dosing Parameters

|                                    |           |
|------------------------------------|-----------|
| <b>Number of doses in the pool</b> | <b>#</b>  |
| <b>Total Volume</b>                | <b>ml</b> |
| <b>Extender Volume</b>             | <b>ml</b> |

# SQA-Vt Product Performance Data:



| <b>SQA-VT</b>                   | <b>TSC</b>  | <b>MSC</b>  | <b>Motility %</b> |
|---------------------------------|-------------|-------------|-------------------|
| <b>Intra Device Variability</b> | <b>3.69</b> | <b>4.99</b> | <b>5.41</b>       |
| <b>Inter Device Variability</b> | <b>1.5</b>  | <b>4.55</b> | <b>5.64</b>       |

## Dynamic Range:

**TSC: 0-20 Bill / MI**

**MSC: 0-20 Bill / MI**

**Motility: 0-100 %**

## Precision (CVs):

**TSC: 4.0 %**

**MSC: 5.5 %**

**Motility: 6.0 %**

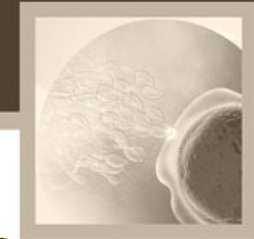
## Accuracy:

**TSC: 0.90**

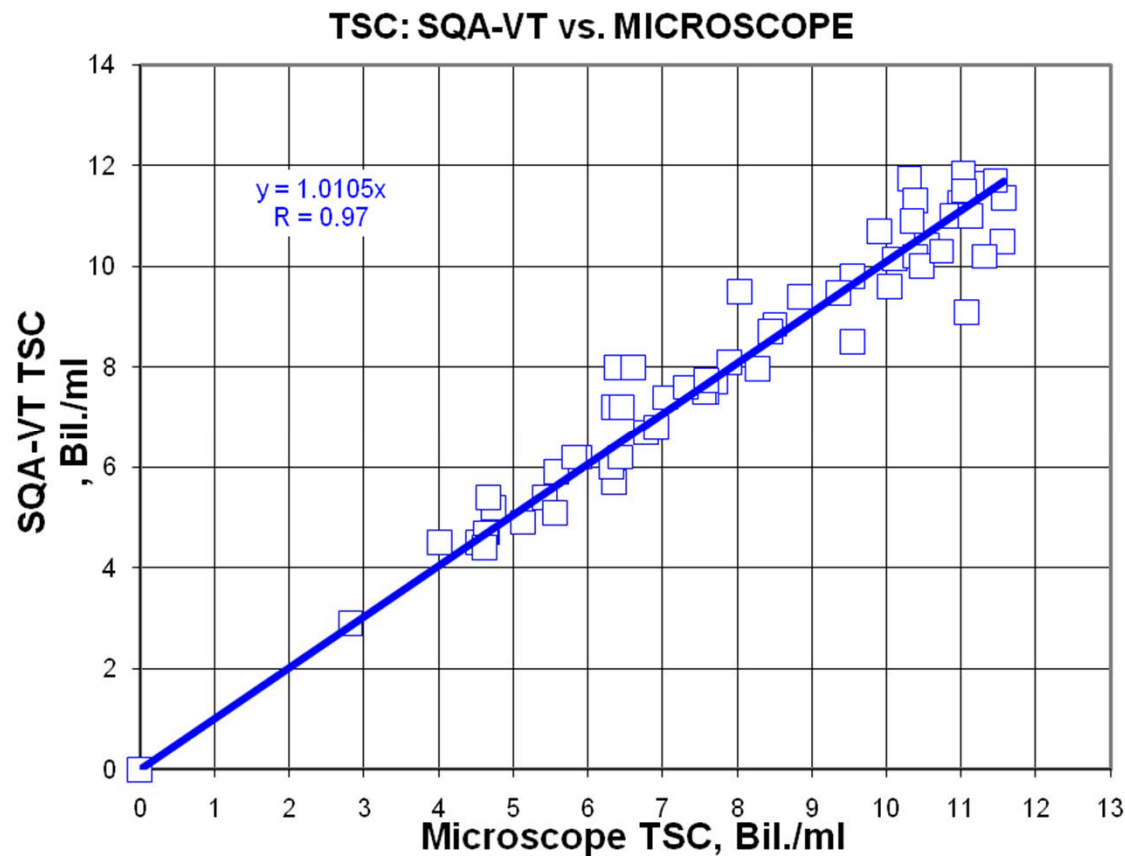
**MSC: 0.90**

**Motility: 0.90**

# SQA-Vt Product Performance Data



## Sperm Concentration: Correlation to the microscope (automated vs. manual method)

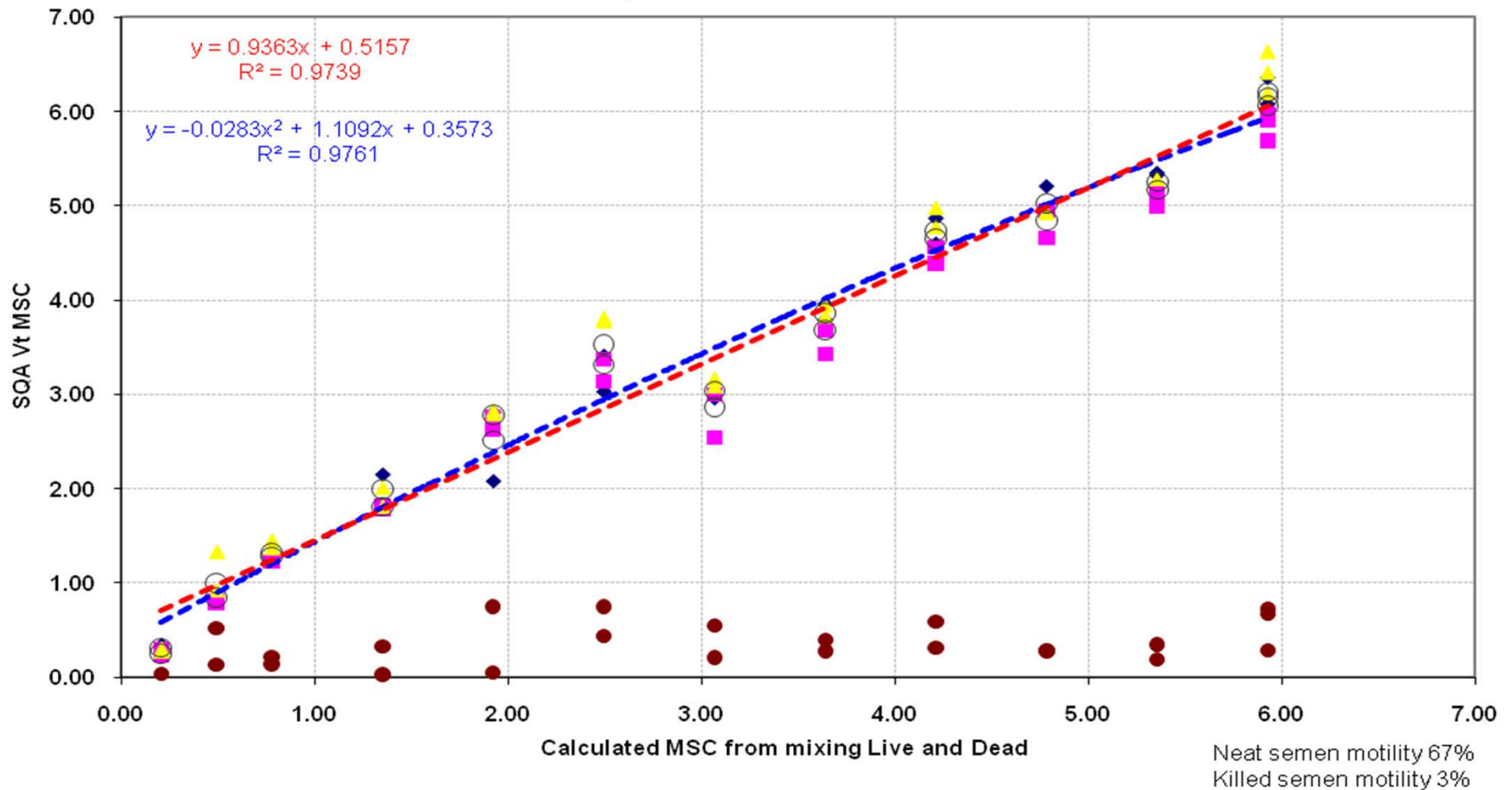


# SQA-Vt Product Performance Data



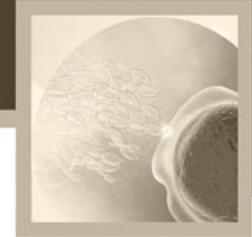
SQA Vt verification study - Diamond K Research 28 July 2004

## Motile Sperm Cell Concentration



#104 #281 #43 Avg all Max diff between units Poly. (Avg all) Linear (Avg all)

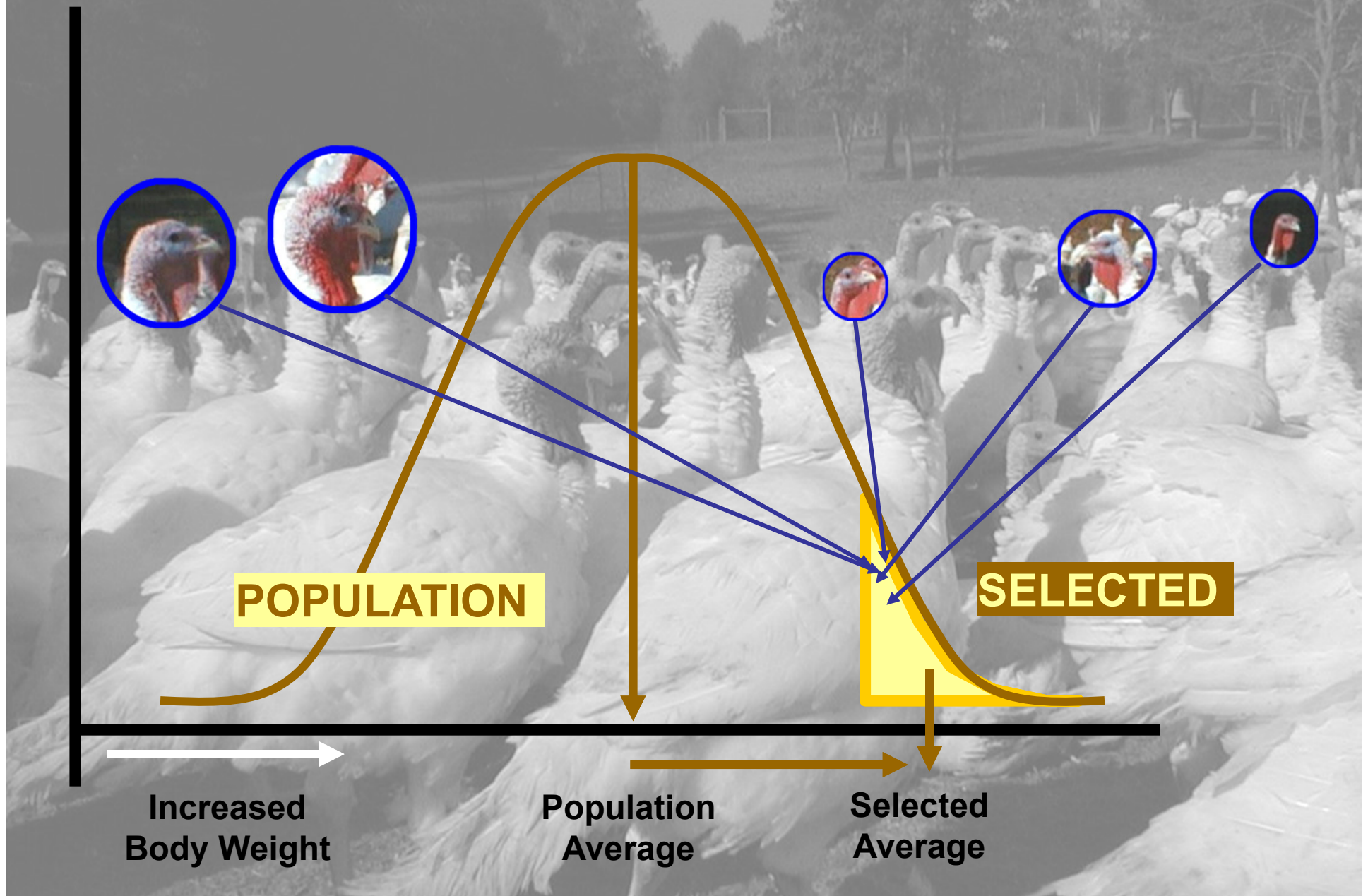
# Optimize Production at Turkey Breeding Facilities



- **Sort males to optimize offspring's**
  - Weight
  - Genetic traits
- **Increased body weight of offspring**
  - Increased productivity
  - Economic gain

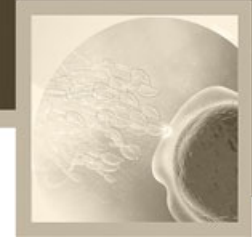


# Example: Body Weight





# Impact of the Selection Process



**Selected  
Average**

minus

**Population  
Average**

**Selection Differential**

**X**

**Heritability**

**=**

**Estimated Breeding  
Value (EBV)**

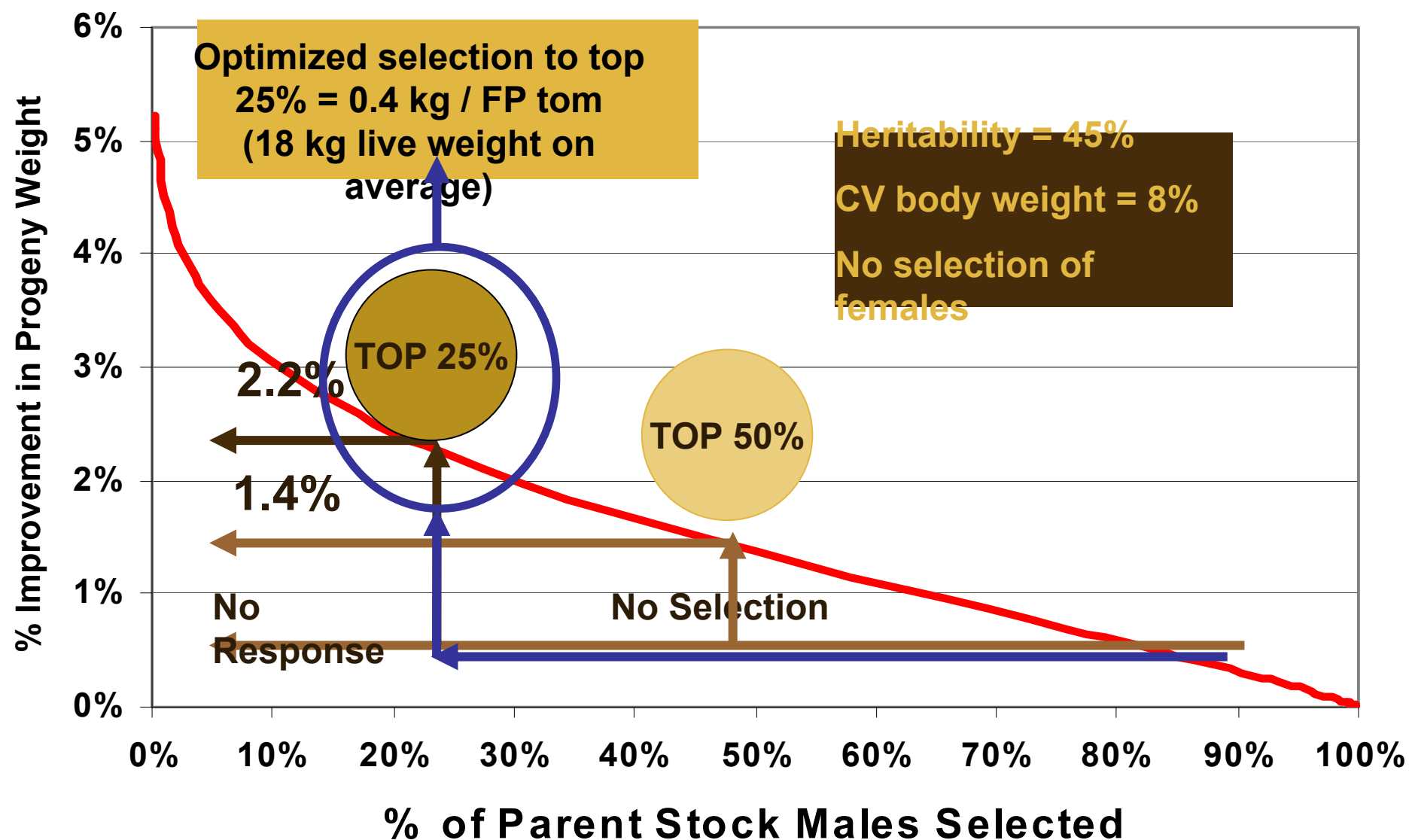
**REACH**

**Estimated Progeny  
Difference (EPD)**

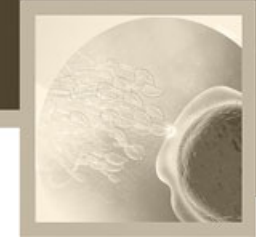
# IMPACT of Selecting Male Parent Stock



## Selection Response in Parent Stock Males

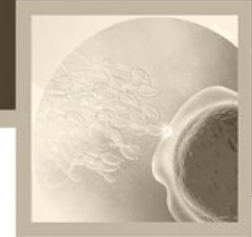


## SQA-Vt: Economic Model for Improved Weight Gain in a Mixed Farm (males + females)



- **Current selection process (Top 50 %) results in a weight gain of 250g per male**
- **SQA-Vt improved selection process (Top 40 %) results in:**
  - A weight gain of 310g per male – an improvement of 60g per male over the current selection process
  - 1.0 million males would gain 60,000kg (60 tons) overall
  - The breast accounts for 25 % of the bird's weight. The increased profit attributable to breast weight:  
 $60,000\text{kg} \times 25\% \times 2.4\text{€ / kg} = 36,000\text{€}$
  - Increased profit attributable to the remaining weight gain:  
 $60,000 \times 75\% \times 1.5\text{€} = 67,500 \text{ €}$
  - Total profits are increased by 103,500€ per 1.0 million males slaughtered

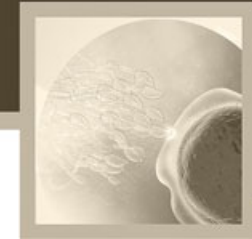
## SQA-Vt: Economic Model for Improved Weight Gain in a Mixed Farm (males + females)



- **Reducing the male to female ratio of the parent stock from 7 % males to 5 % males (which constitutes a 20 % reduction in the number of males), results in savings of approximately 29,400€ per 1.0 million males slaughtered**
- **Ramit Farms currently needs 3,500 parent stock males to produce 1.0 million males for slaughter**
- **A 20 % reduction in the male parent stock (700 males at 42€/ male) results in savings of 29,400€ as noted above.**

**The question is then raised – *How to successfully inseminate the same number of females using the heavier males?***

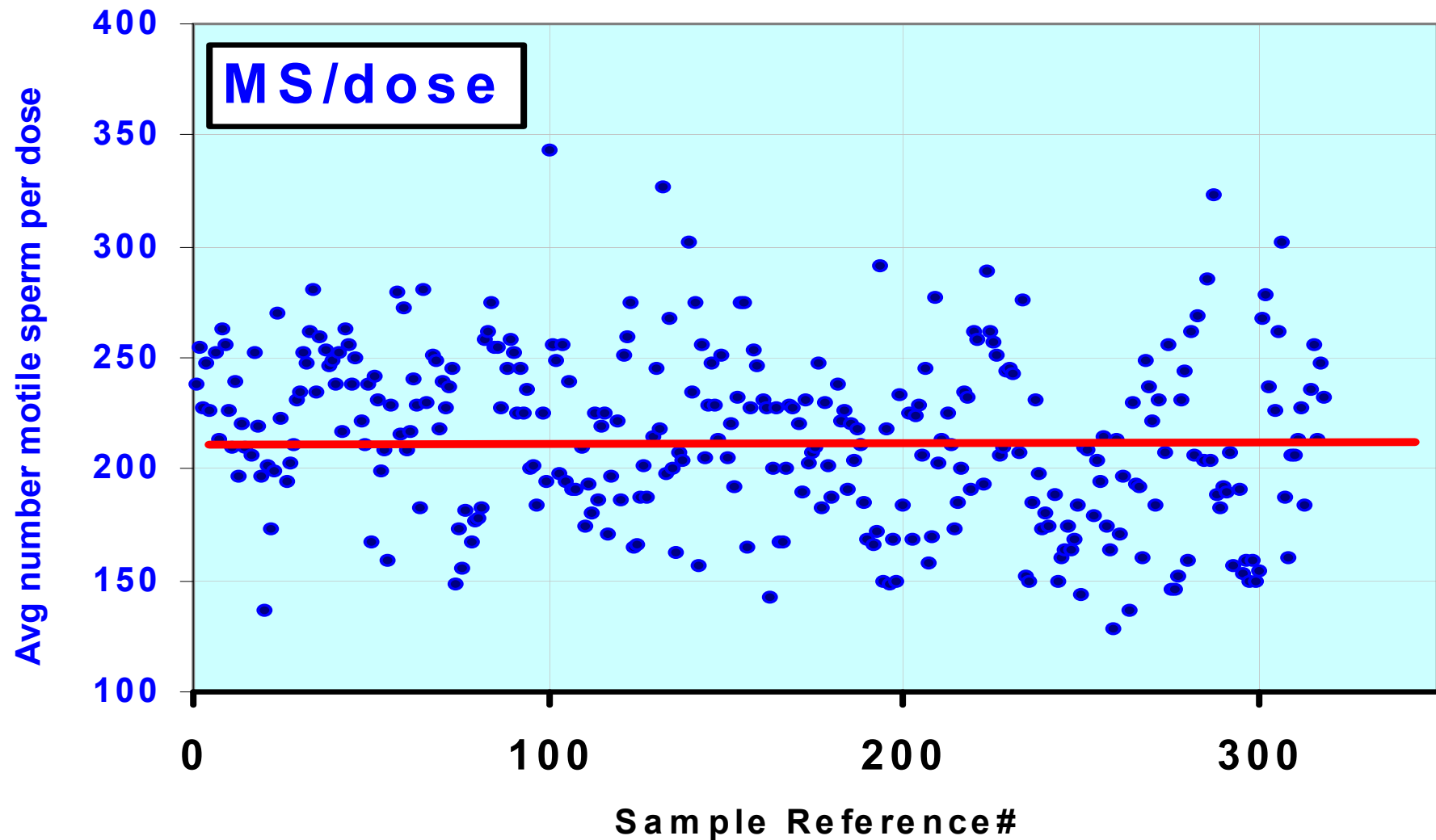
# Use of the SQA-Vt at Cuddy Farms, USA



# Biological Variability of Sperm in a Commercial Turkey Farm



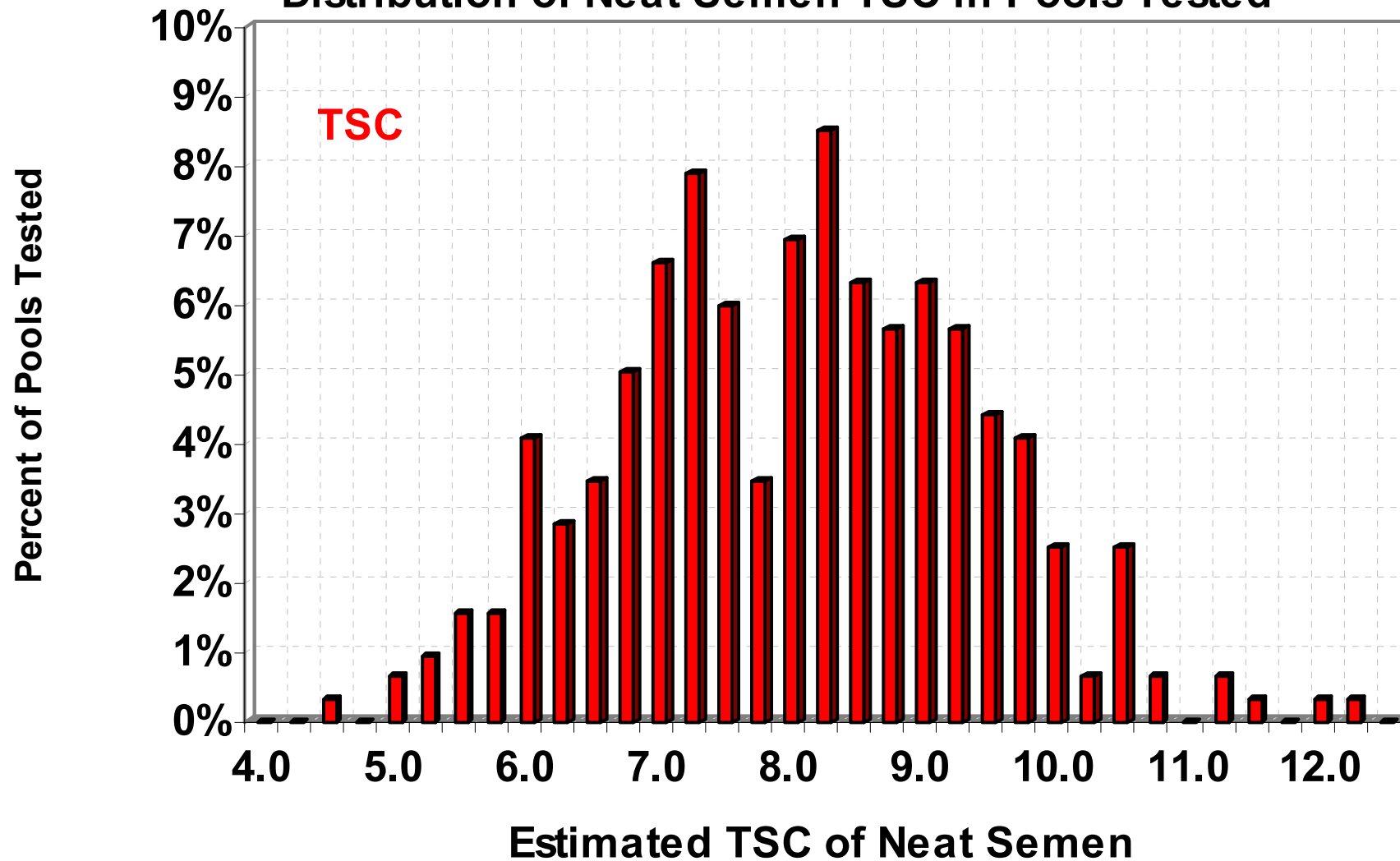
**Falt Rock Stud Farm**  
**SQA Vt Beta Trial - Sept 2004**  
**Semen diluted to 45% neat semen**



# Biological Variability of Sperm in a Commercial Turkey Farm



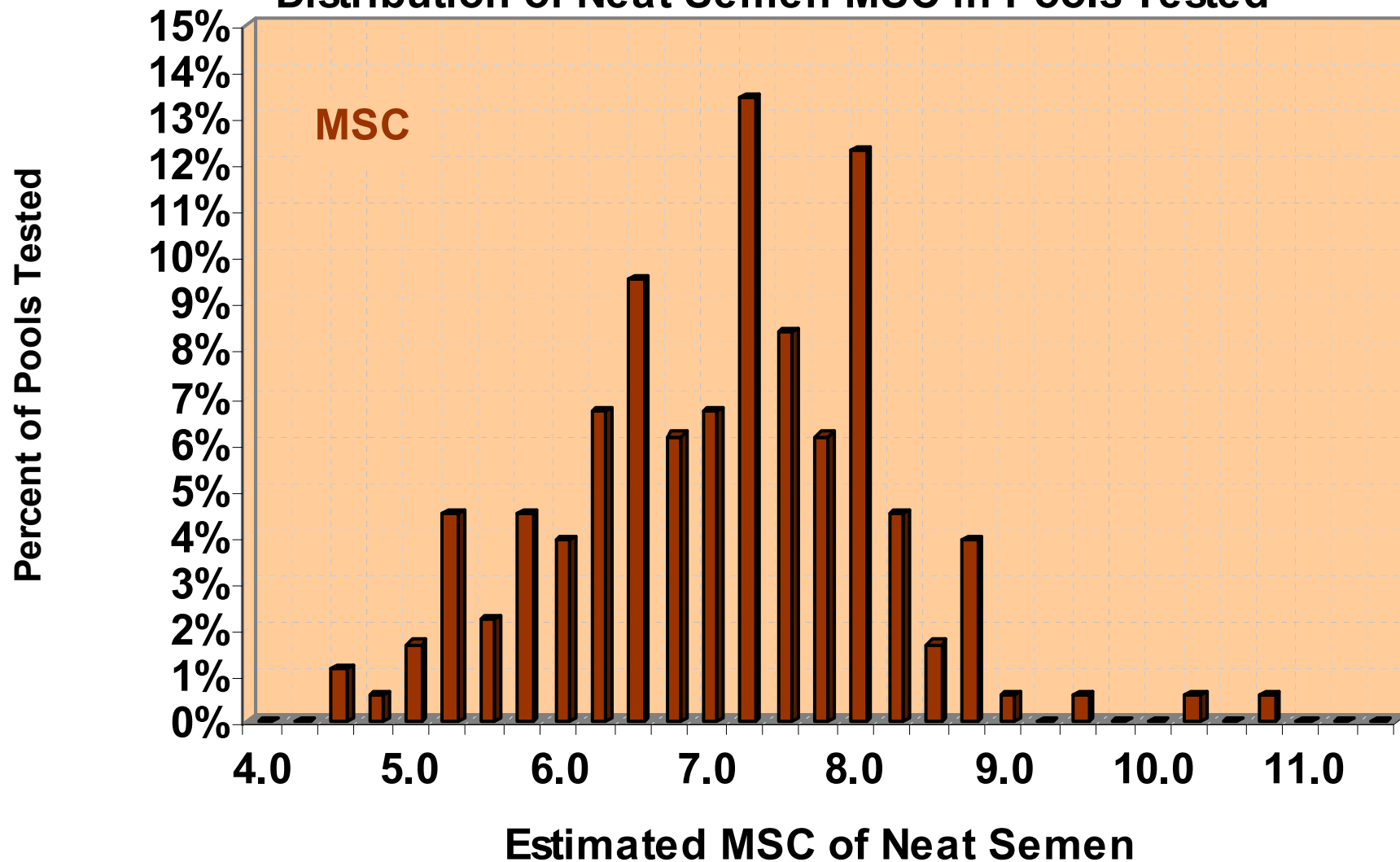
**Flat Rock Beta Field Trial with SQA Vt**  
**Distribution of Neat Semen TSC in Pools Tested**



# Biological Variability of Sperm in a Commercial Turkey Farm

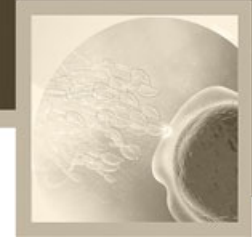


## Flat Rock Beta Field Trial with SQA Vt Distribution of Neat Semen MSC in Pools Tested





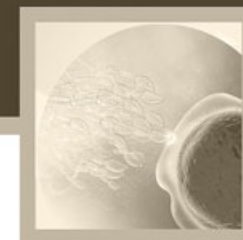
# Clinical Trial: Testing the SQA-Vt Economic Model for Improved Weight Gain



**The following data is from trials conducted at Ramit Farms – PHASE I (SORTING MALES)**

- **Description of the trial:**
  - 135 males were tested to classify them as producers of high or low quality sperm
  - Two examinations took place on the same males: The first at 28 weeks before the flock insemination, the second at the end of the flock insemination cycle
  - Semen 'pools' from each group were checked weekly

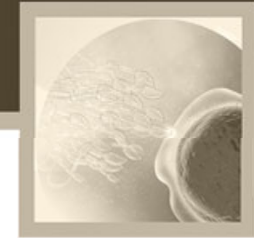
## Clinical Trial: Testing the SQA-Vt Economic Model for Improved Weight Gain



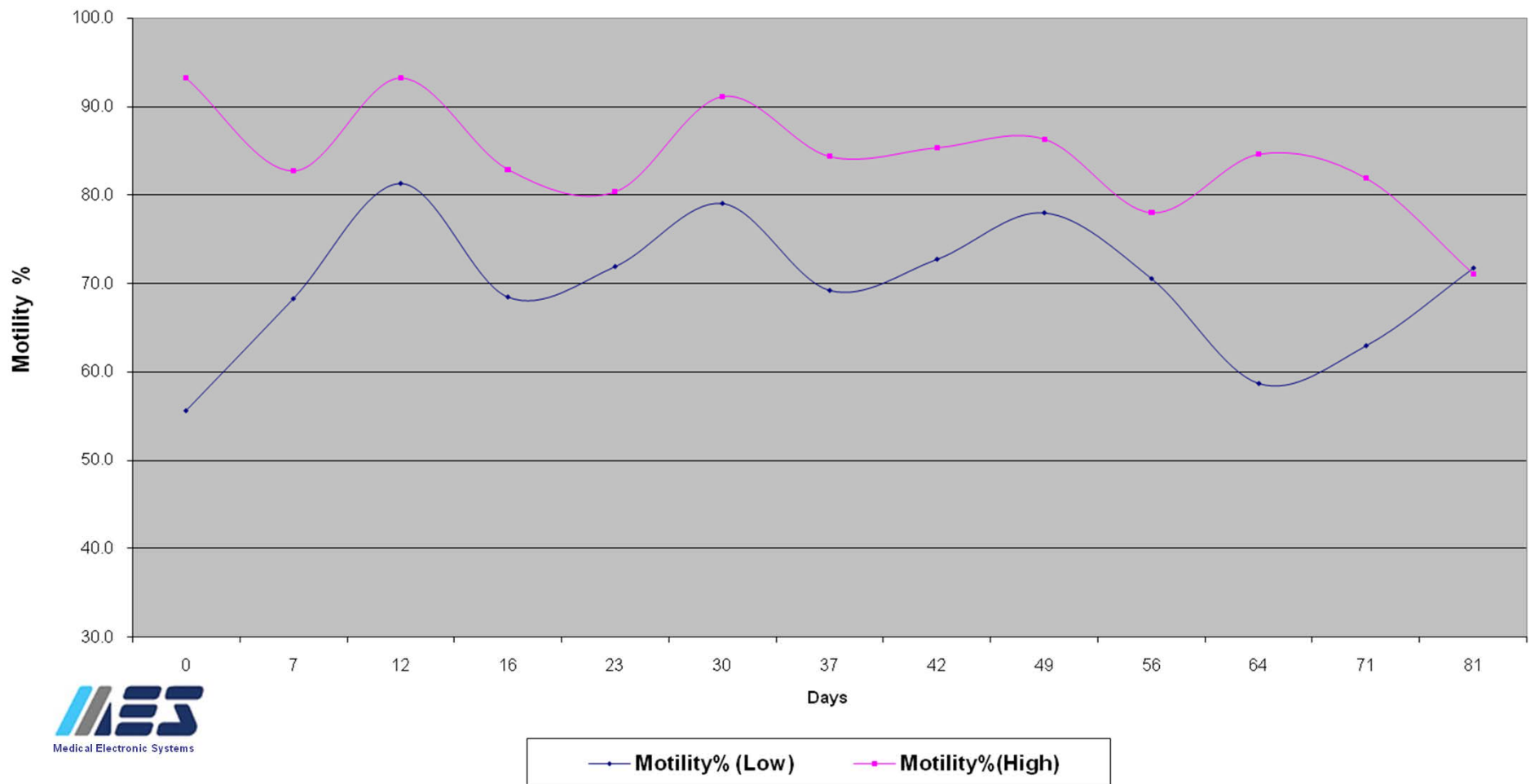
### Results of PHASE I Ramit Farms Trial:

- **The SQA-Vt technology can be used successfully to sort males at an early stage into two groups based on their semen quality**
- **Sorting groups of males by sperm quality demonstrates this is an effective way to predict and monitor their future fertility**
  - Males with poor semen quality tended to produce poor quality throughout the insemination cycle
  - These results agree with a similar study conducted in Maryland in 1998

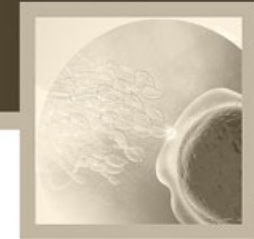
# Ramit Study: Sperm Motility from Two Groups of Males



PHASE I of the clinical study performed at Ramit Corporation showing sperm % motility over a timeline of 81 days from two groups of males classified as HIGH and LOW quality sperm producers at the beginning of the study.

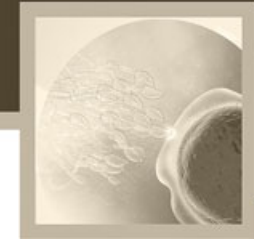


# Clinical Trial: Testing the Economic Model for Improved Weight Gain



- **The following data is from trials conducted at Ramit Farms – PHASE 2:** Insemination of Females w/SQA-Vt prepared semen vs. current manual method)
- **Description of the trial:**
  - Two groups of females (1,100 in each group) were inseminated based on two protocols
    - **Ramit Protocol:** Fixed 1:1 dilution of semen
    - **SQA-Vt Protocol:** Fixed # cells per semen dose (140 million live cells
  - The trial was conducted over the entire insemination cycle
  - The semen and fertility parameters of the two groups were identical prior to conducting the trial

# Clinical Trial: Testing the Economic Model for Improved Weight Gain



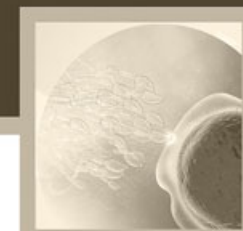
## Results of PHASE 2 Ramit Trial:

- **22 % less semen was used in the SQA-Vt group vs. Ramit control group**
- **12 % less males were used in the SQA-Vt group – they were eliminated at the beginning of the trial because of their low quality semen**
- **Even though the SQA-Vt group had less males (12 % less), no semen shortage was experienced**
- **SQA-Vt Fertility Results: 1.8 % improved over Ramit control group**

## Conclusion:

- **It is possible to use significantly less semen (22 % less) and less males (12 %) and still obtain improved fertility (1.8 %) using the SQA-Vt technology.**
- **It can be further concluded that it is possible to increase selection pressure in the same way by using heavier weight males.**

## Economic Model Summary: Based on improved selection pressure from 50% to 40%



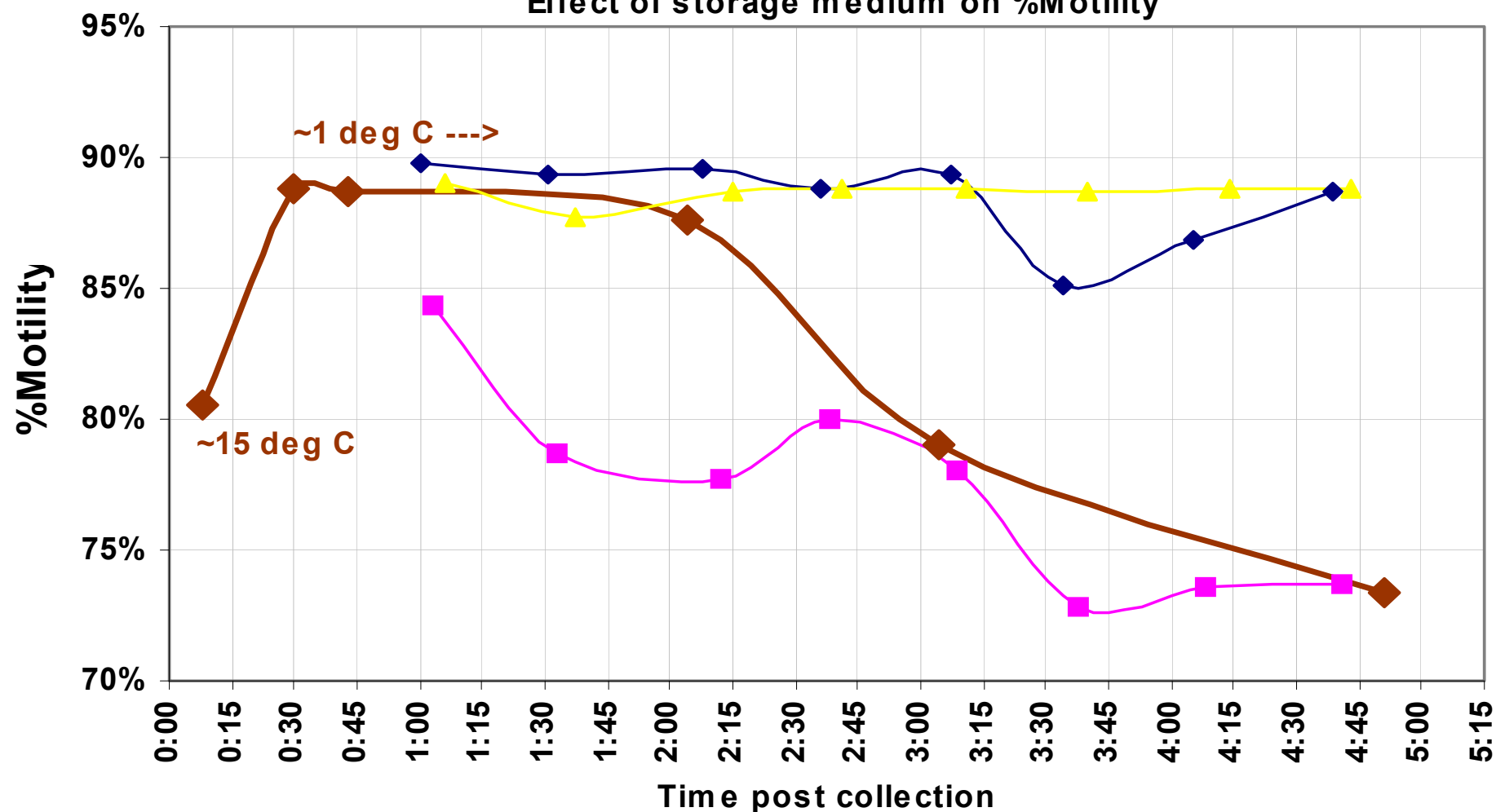
| Income /Expense: Based on 1.0 Million slaughtered Males                    | Price in Euros |
|----------------------------------------------------------------------------|----------------|
| Contribution based on the price of breast meat                             | 45,000         |
| Contribution based on the price of red meat                                | 84,000         |
| Reduction in the cost of maintaining males                                 | 29,600         |
| Total Income                                                               | 158,600        |
| Expenses                                                                   |                |
| 7% Depreciation for 10 SQA-Vt systems @19,500 Euro per system for 6 months | 13,650         |
| Tests – based on 10,000 tests                                              | 10,000         |
| Total expenses                                                             | 23,650         |
| Net profit                                                                 | 134,950        |
| Net return on investment                                                   | 1:6            |

# Using the SQA-Vt to Compare Semen Extenders



Flat Rock - 040917

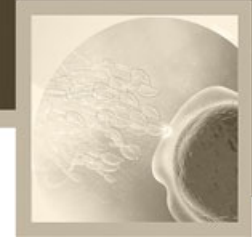
Effect of storage medium on %Motility



Samples extended at 50:50 ratio (except neat) - stored @ ~1 deg C

Neat Extender Extender+H2O 0.9%NaCl

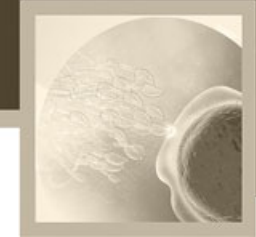
# SUMMARY / CONCLUSIONS



- **Fact #1: There is a large biological variability between males (fertility)**
- **Fact #2: There is a large biological variability between insemination doses prepared based on current protocols**
- **The SQA-Vt can positively impact costs and fertility by optimizing the insemination process based on:**
  - Increasing the weight of the next generation by selecting semen from high quality males and eliminating poor semen quality males
  - Reducing the # males by 20 % (and reducing their maintenance costs) without impacting fertility or suffering shortages of sperm
  - Measuring the impact of age, disease, extenders and sperm collection and handling techniques on fertility



## Advantages of using the SQA-Vt.....



- **Accurate and reliable test results**
- **Easy to use and cost effective**
- **Consistent and standardized dose preparation**
- **Maximize # and quality of AI doses**
- **Flock optimization**
- **Comprehensive flock management**

# SQA-Vt

New technology for  
increasing profits in the  
turkey industry

