

# National Beef Recording and Improvement Scheme

ICAR, June 2011



Animal Production Institute, Irene

## **ARC has mandate to conduct research, development and technology transfer in order to**

- Promote agriculture and industry
- Contribute to a better quality of life
- Facilitate/ensure natural resources conservation

**National Beef recording and Improvement Scheme  
resorts under Strategic Objective: Enhancement of  
Nutrition and Food Security and Safety**

# Long Term Objectives

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## 1. Recording services

## 2. Technology development

2.1 Developing and maintaining credible and reliable national beef recording and improvement systems and procedures.

2.2 Conducting appropriate beef recording and improvement related research and technology development and adopting applicable global research results.

## 3. Technology transfer

3.1 Training and technology transfer - especially recording practices and optimal use of information.

## 4. Consultation services

4.1 Rendering a consultation service regarding beef cattle improvement.

4.2 Assisting all role players in setting breeding objectives and implement strategies/methods to achieve them.

# Long Term Objectives

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## 5. Liaison

- 5.1 Liaising with the livestock industry.
- 5.2. Creating and building partnerships with other organizations.

## 6. Other

- 6.1. Continuous evaluating all products and services to ensure they are value adding, client orientated, user friendly and time & cost efficient.
- 6.2 Awarding excellent performing herds and animals.

# Short Term Objectives (1)

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## 1. Recording

- 1.1 To focus on extending services to non-seed stock farmers.
- 1.2 To focus on increasing the accuracy of recorded performance data, especially farmer-recorded data.
- 1.3 To continue actions (especially training and accreditation of additional technicians) to make real time ultrasonic (RTU) scanning services available to Scheme members in all regions for measuring certain carcass traits on Phase C and Phase D tested bulls.

# Short Term Objectives (2)

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## 2. Technology development

- 2.1 To render inputs and assist, where necessary, in all processes regarding the further development and refining of functionalities and products (reports, etc.) of IRIS Beef.
- 2.2 To render inputs and assist, where necessary, in all processes regarding the further development of beef related LOGIX functionalities (especially electronic data transfer) and reports.

# Short Term Objectives (3)

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## 2. Technology development

- 2.3 To continue with technical inputs towards ICAR regarding the refinement and expansion of the international beef recording guidelines.
- 2.4 To continue with the extension of the rules and guidelines of the Scheme where necessary.
- 2.5 To continue the investigation and development of real time ultrasonic (RTU) scanning applications in the beef cattle industry.



# Short Term Objectives (4)

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## 2. Technology development

- 2.6 To develop systems and procedures for the verification (statistical and on-farm) of recorded performance data, especially farmer-recorded data.
- 2.7 To continue the further development, refinement and marketing (local and abroad) of the ARC's beef recording and management farm software, BeefPro.



# Short Term Objectives (5)

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## 3. Technology transfer

- 3.1 To continue with present technology transfer actions and explore new possibilities. Specific actions to be pursued are lectures at farmers' days, symposia and training courses.
- 3.2 To continue with the updating and refinement of the Beef Recording and Improvement Scheme's Manual.

# Short Term Objectives (6)

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## 4. Information dissemination

- 4.1 To continue with present information dissemination actions and explore new possibilities. Specific actions to be pursued are **farmers' days, training courses and newsletters**. Training courses in the use of BeefPro™ farm software will receive high priority.
- 4.2 To continue the using **e-mail technology** for mass communication with and information dissemination to members of the Scheme, breeders' societies, etc.

# Short Term Objectives (7)

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## 5. Consultation services

- 5.1 To, in conjunction with training of personnel where necessary, market and expand consultation services to all sectors of the livestock industry.

# Short Term Objectives (8)

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## 6. Liaison

- 6.1 To continue with the present liaison with the livestock industry, especially regional advisory committees and breeders' societies.

# Short Term Objectives (9)

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## 6. Generic & Other

- 6.1 To continue with the various awards for excellent performing herds and animals.
- 6.2 To continue with the optimal utilization of all testing centres through commercialisation.
- 6.3 To optimize the present and to explore new means for marketing of all Beef Recording and Improvement products and services.

# Short Term Objectives (10)

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## 6. Generic & Other

- 6.4 To keep improving the image and restore and building confidence in the ARC-API amongst clients and potential clients as a centre of excellence that can deliver as promised.
- 6.5 To benchmark various aspects pertaining to the objectives of the Beef Recording and Improvement division.

# Phases of the Scheme

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- Reproduction phase (Phase A1)
  - Suckling phase (Phase A2)
  - Post weaning phases:
    - On-farm recordings (Phase B)
    - Central performance tests (Phase C)
    - On-farm performance tests (Phase D)
    - Feedlot recordings (Phase E1)\*
    - Slaughter phase (Phase E2)\*
- \* Non-active



# National Beef Recording and Improvement Scheme

## PHASE A

Stud & Commercial

### Evaluation of cow herd

- Birth weight
- Weaning weight
- Cow weight
- Reproduction rate
- Cow efficiency

## PHASE B

Stud & Commercial  
Heifers and Bulls

### Post-weaning growth (on farm)

- Yearling weight
- 18 Month weight
- Post weaning growth
- Growth per day of age
- Scrotum circumference

## PHASE C

Stud Bulls

### Standard growth tests

- Average daily gain
- Growth per day of age
- Feed conversion ratio
- Body measurements
- Scrotum circumference
- Functional evaluation

## PHASE D

Stud & Grade Bulls

### Farm growth tests

- Average daily gain
- Growth per day of age
- Efficiency ratio
- Body measurements
- Scrotum circumference
- Functional evaluation

## PHASE E

Progeny Test

### Carcass evaluation

- Carcass weight
- Dressing %
- Fat, muscle, bone %
- Tenderness
- Marbling

# Participation & Outputs (1)

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- **Reproduction & Suckling phases (A)**
  - **33** beef and dual-purpose breeds participated in the Scheme.
  - **1086** stud herds (phase A & B)
  - **133** commercial herds (**10 817** breeding females)
  - **170 248** breeding females (>2 y, phase A)
  - **274 438** weights/year (phase A&B)
  - **Emerging commercial sector on Intergis.**
- **Post wean on-farm recordings (Phase B)**
  - **43 000** weights/year

# Participation & Outputs (2)

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- Central performance tests (C)
  - 23 breeds
  - 11 test centres (4 ARC, 7 private)
  - 1 170 bulls/year (decreased..)
- On-farm performance tests (D)
  - 23 breeds
  - 270 test centres
  - 420 tests/year
  - 11000 bulls/year

# Requirements for Participation

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- Identification of all animals
- All calves recorded at birth
- Approved cattle scale
- Handling facilities
- Testing of entire herd
- Regular weighing, record keeping

# Traits Evaluated (1)

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## ➤ **Reproduction**

- Age at first calving
- Inter calving period
- Reproduction index
- Days since last calving
- Scrotum circumference

## ➤ **Ease of calving and calf mortality**

- Birth weight
- Ease of calving
- Status of calf at birth
- Dead born calves (# & %)

# Traits Evaluated (2)

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- **Growth rate (pre-wean) & Mothering ability**
  - Weaning index
- **Cow efficiency**
  - Cow efficiency index
- **Growth rate (post-wean)**
  - 12 months index\*
  - 18 months index\*
  - ADG index (Phases C & D)

# Traits Evaluated (3)

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- **Feed efficiency**
  - Daily feed intake (Phase C)
  - FCR index (Phase C)
  - Kleiber ratio index (Phase D)
- **Skeletal development**
  - Shoulder/hip height
  - Body length
- **Functional appearance**
  - Linear classification of various functional traits

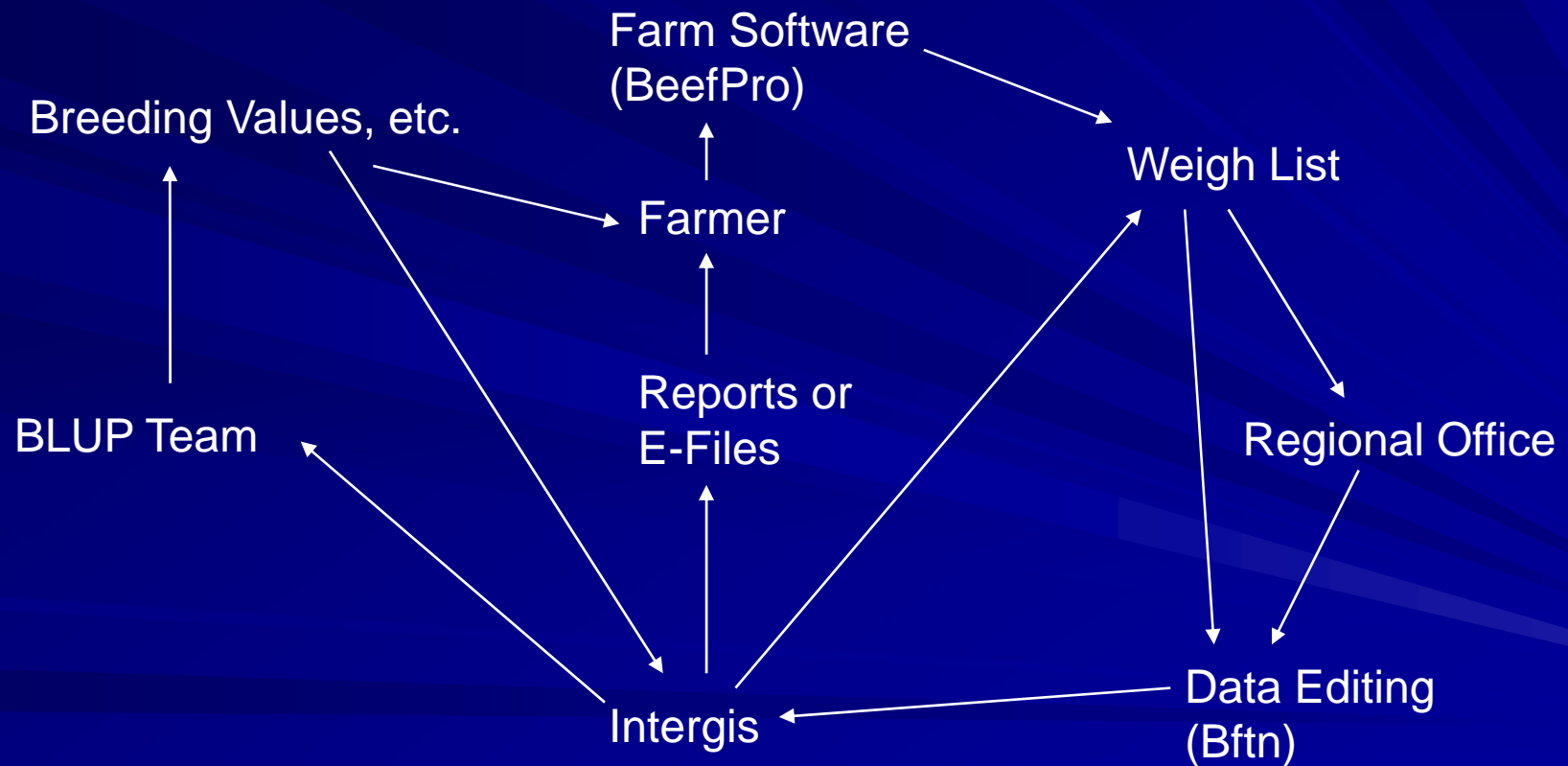


# Traits Evaluated (4)

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- **Carcass & Meat traits (RTU)**
  - Fat thickness
  - Eye muscle area
  - Marbling (intra muscular fat %) index
  - Carcass red meat % & index
  - Muscle %
- **Pelvic Opening Measurements**
  - Height
  - Width
- **Tick resistance**
  - Tick resistance index

# Flow of Data & Reports - On-farm Recording Data (A & B)



# Genetic Evaluations: Services

## *Breeds*

National genetic evaluation service is currently rendered for 16 beef cattle breeds.

## *Frequency*

Evaluations conducted once per year for most breeds (i.e. Drakensberger, Charolais, Santa Gertrudis, Sussex, Tuli, Braunvieh, Gelbvieh, Nguni, Afrikaner, South Devon, Red Poll, Beefmaster and Pinzgauer) and twice per year for three breeds (i.e. Bonsmara (includes South Africa, Namibia, Brazil and Argentina), South African Angus and Hereford).

## *Dissemination of evaluations*

The estimated breeding values are supplied to the farmers in the form of hard copy (herd profile), CD and electronically (through either a pdf or csv file).

## *Genetic Evaluation Model and traits*

BLUP Breeding values are calculated using Animal Model using a series of multivariate analyses. The PEST software program is used in these evaluations. The use of genetic groups was recently investigated for the Bonsmara breed and genetic groups are now including in the analysis.

The following traits are included in the evaluation: birth (direct and maternal), weaning (direct and maternal), yearling, 18-months and mature weights; post-weaning average daily gain and feed conversion ratio on test, Kleiber ratio (on farm test), cow efficiency, calf tempo, scrotal circumference, age at first calving, inter-calving period, height and length measured at the end of post-weaning test, Dressing percentage, beef yield, marbling.

The following economic indexes are provided to farmers: feedlot profitability and cow profit.

## Genetic evaluations: Research

A number of research initiatives are currently under way to investigate different aspects of beef genetic evaluation. These include:

- Implementation of interim breeding values for post-weaning average daily gain on test and feed conversion ratio.
- Investigation of the handling of early weaning in the national genetic evaluations. Farmers in some regions in South Africa are practicing early weaning (at around 100 days of age) for heifers.
- Re-estimation of genetic parameters for Bonsmara cattle.
- Feasibility of including genetic groups in genetic evaluation to account for multi-sire breeding.
- Development of genetic prediction for residual feed intake.
- Development of economic selection index for Nguni cattle.
- Detection of quantitative trait loci for tolerance to ticks.
- Genomics?

## NOTES ON APPLIED BEEF BREEDING

The following research is being conducted in applied beef cattle breeding:

### **Environmental descriptors influencing performance of different beef cattle ecotypes**

**The study will collect information in order to assess the:**

- reproductive parameters in order to determine age at first calving, calving intervals, reproductive longevity
- productive parameters to determine growth performance\the production environment in order to determine the climatic descriptors that influence performance of different genotypes

**This information will then be used to:**

- identify factors influencing reproductive performance
- identify factors influencing productive performance
- characterize production environments

### **Outcome:**

- Environmental descriptors influencing reproductive and productive performance will be identified.
- Environmental descriptors can be included in the genetic evaluation of livestock to more accurately identify the best breeding stock



## Characterization of breed additive and heterosis effects in beef cattle using experimental results

This study will analyse crossbreeding results from 29 genotype combinations and supply the necessary information needed for the development of multi-breed genetic evaluations, breeding objectives and decision making for both pure and crossbreeding.

### **The following traits will be studied:**

- Birth weight
- Weaning weight
- Cow weight at partus
- Calving percentage (cows calved / cows mated)
- Preweaning mortality
- Percentage weaning (Calves weaned / cows mated)
- 19 Month weight of heifers
- Feedlot ADG for steers

### **Outcome:**

- Input values based on South African information to simulate breeding objectives in crossbreeding systems for South African conditions
- Values based on South African information that can be used to estimate breed adjustment tables (compare EBV's between breeds directly) or for the estimation of multibreed EBV's.



# Improved production efficiency to reduce the carbon footprint of beef

Breeding objectives to improve the production efficiency of beef cattle can play a significant role in reducing enteric methane production from beef production. Variations between animals, between breeds, and across time, provide the potential for improvement through selection.

## **The aim will be to:**

- To establish if there is any relationship between methane production and growth and efficiency traits in young bulls under intensive feeding
- To estimate genetic variance components for residual feed intake and its correlations with other traits
- To develop a trait that measures kg calf weaned per Large Stock Unit.
- After the initial study on the Bonsmara, the study will be expanded to breeds that represent the different breed types in South Africa, viz. Afrikaner or Drakensberger, Angus and Charolais.

## **Outcome:**

Baseline information for the development of breeding objectives for South African beef breeds to improve production efficiency and thereby reducing the carbon footprint of beef.

# Duties - Technical Assistant - Data Editing (2)

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- To assist farmers with queries regarding submitted performance test data of their animals;
- To assist with general administrative tasks e.g. answering of telephone, filing of data sheets and reports, posting of reports and publications.

# Duties - Technician - Field Work (2)

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- Training of and technical support to BeefPro and GenePro software users in the region
- Rendering consultation services to beef cattle farmers
- Organising of farmers days in the region in conjunction with the region's Beef Advisory Committee
- Technology transfer and advice regarding beef recording and improvement practices, performance test data, breeding values, breeding and management

# Collaborators & Role Players (1)

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- Farmers participating in the Scheme
  - On-farm animal and performance (weights, etc.) recording
- Integrated Registration and Genetic Information System (INTERGIS) & Logix
  - Data verification, storing, processing, reporting
- Dept of Agriculture - Registrar of Livestock Improvement
  - Financing of INTERGIS and Schemes via ARC

# Collaborators & Role Players (2)

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- Private Central Testing Centres
  - Provide facilities for central testing of bulls
- Veld Bull Clubs
  - Provide facilities for on-farm testing of bulls

# Collaborators & Role Players (3)

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- Regional Advisory Committees - Participants in Scheme
  - Advise ARC regional office on local matters regarding the Scheme
- National Advisory Committee - Participants & role players from industry
  - Advise ARC on national matters regarding the Scheme

# Collaborators & Role Players (4)

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- Breeders' Societies (SA & other countries)
  - Promoting participation in the Scheme
  - Promoting proper use of performance data and breeding values
  - Contract for annual BLUP analysis
- Registering Authorities (SA Stud Book & other)
  - Promoting participation in the Scheme
  - Promoting proper use of performance data and breeding values



# Collaborators & Role Players (5)

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- Software houses
  - Easy recording according to correct parameters and formats for INTERGIS (Scheme and Studbook) requirements
  - Easy sending of Scheme's data in correct formats for INTERGIS
- RMRDT
  - Funding of projects
- AI & Embryo Transfer industry
  - Identification and use of best available genetic material

# Beef Scheme's Reports

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- **Clients (farmers) get:**
  - On-farm Evaluation (Wean, 12m, 18m)
  - Cow Progeny Summary
  - Breeding Herd Selection
  - Weigh List (for recording)
  - Growth Test
  - Body Measurements
  - Performance Certificate
  - Functional Appearance
  - RTU Scanning
  - Tick Resistance\*
  - Pelvic Measurements\*

# Logix

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- Intergis's web-based interface for farmers, breeders' societies, Stud Book, ARC, etc.
- Functionalities:
  - Enquiries
  - Reports
  - Search function
  - Data downloading
  - Data input

# Beef Pro<sup>TM</sup>



Professional Beef Management Software  
Professionele Vleisbeesbestuur Sagteware

# BeefPro (& GenePro)

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- Comprehensive herd management software
- Developed by the ARC with a private software house, BenguelaSoft CC
- Support and marketing via ARC officials and private agents
- 750 users (70% stud, 30% commercial)
- **Impact:**
  - Provide in BIG need for Windows herd management software
  - Easy, accurate recording of Scheme's data
  - BIG boost for electronic data submission

# ARC Beef Farmers' Days

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- 6-8 Days annually throughout country
- Organised by regional staff and regional Advisory Committees
- Attended by 400-500 people, mostly farmers
- **Impact:**
  - Technology transfer
  - Promote ARC's services & products
  - Visibility of ACR



# ARC Representatives

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- Officials act as ARC representatives on beef breeders' societies
- Attend board meetings and AGMs
- **Impact:**
  - Promote participation in Scheme
  - Give technical advise
  - Promote ARC's services & products
  - Ear-on-the-ground - needs, problems, etc.
  - Visibility of ACR



# ARC Beef Awards (1)

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- Merit awards to Phase C tested bulls
  - Merit awards to Best Producing Cows
  - Beef Cattle Improvement Herd of the Year awards\*
  - Best Elite Cow award per breed\*
  - Platinum awards\*
  - Special Performance Test Class\*
- \* (Beef Star Performers Gala function)

# ARC Beef Awards (2)

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## ➤ Impact:

- Acknowledge well performing herds and animals in scheme
- Promote participation in the Scheme
- Promote scientific breeding and management principles
- Promote scientifically based management practices
- Demonstrate benefit of performance testing

# Publications

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- Scheme's News Letter
- Scheme's Annual Report
- Beef Recording & Performance Testing Manual
- BeefPro & GenePro Manuals
- Beef Production Manual\*
- Beef Breeding in SA\*
- **Impact:**
  - Information dissemination
  - Technology transfer

# Courses & Lectures

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- Beef Recording & Improvement Course (new participants)
- Lectures at ARC's Beef Production Course
- Lectures at farmer's days, symposia, workshops, meeting, etc.
- Lectures at universities
- **Impact:**
  - Information dissemination
  - Technology transfer

# Shows

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- Performance Test Classes:
  - Super Cows
  - Phase C tested Bulls
  - Phase D tested Bulls
- Shows: Pretoria, Vryburg, Bloemfontein, Pietermaritzburg, Moreesburg,...
- **Impact:**
  - Promote proper use of performance test data in show judging
  - Visibility of ACR

# Performance Testing Trade Mark

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# Scheme's Pages on ARC Website

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- Comprehensive info of Scheme
- **Impact:**
  - Information dissemination
  - Technology transfer



# Consultation Services

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- Mainly farmers - participants of Scheme & other
- Breeders' societies, etc.
- **Impact:**
  - **Technology Transfer**

# Challenges, Options & Opportunities (1)

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- Adequate funding of Schemes by Dept of Agric or ARC or industry or clients
- Adequate, well-trained and passionate staff to continue and expand services
- Maintain critical mass of experienced staff
- Continued development of staff through training and exposure to new technology

# Challenges, Options & Opportunities (2)

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- Support of Scheme and INTERGIS by breeders' societies (Competition from Breedplan, etc.)
- Retaining clients (farmers)
- Expansion of Scheme to other countries
- Training of breeders (& breeders' societies staff) participating in the Scheme in other countries
- Emerging farmers' recruitment/migration from Kaonofatso ya Dikgomo to National Scheme

# Challenges, Options & Opportunities (3)

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- Automate systems and procedures
- Increasing electronic data submission and reporting
- Continued research and development - new technology & changing needs
- Continuous updating and application of the newest available technology

# Challenges, Options & Opportunities (4)

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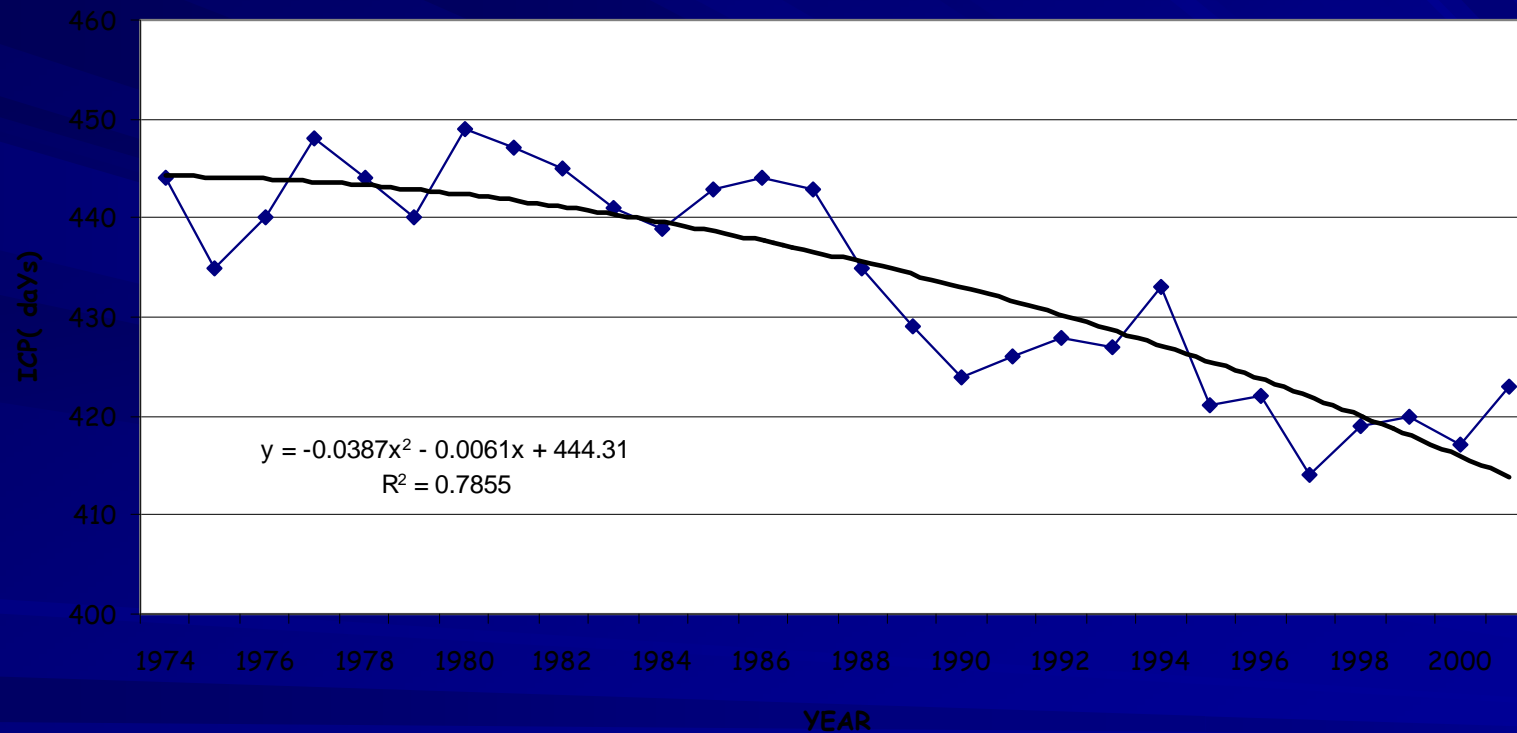
- Cost vs impact of on-farm bull testing with current protocol & procedures
- Use of accredited private persons for performing certain functions/tasks on behalf of ARC
- Cost vs impact of bulls tested at ARC central testing centres
- Minimising costs and maximising impact of representatives on breeders' societies

# Challenges, Options & Opportunities (5)

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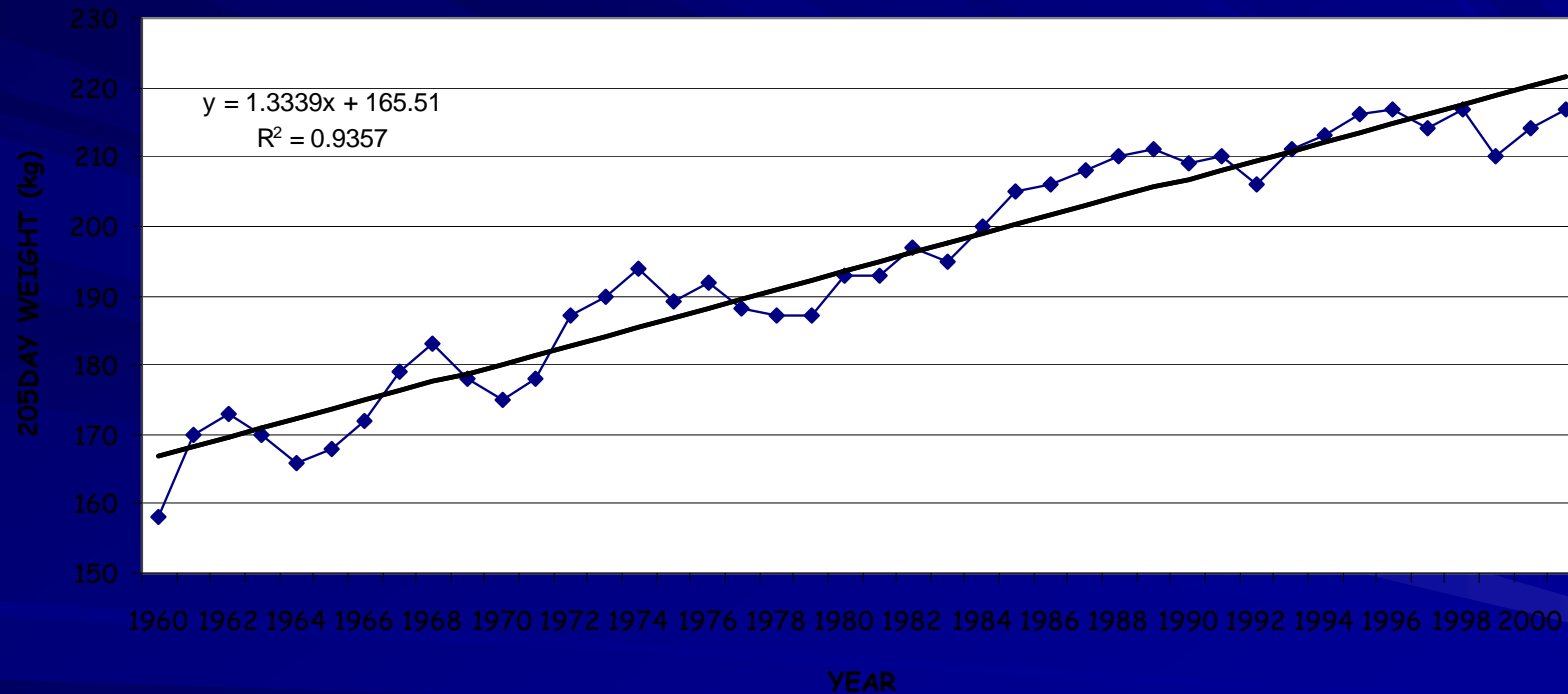
- Automation and integration of data flow, systems and reporting
- Recording of additional reproduction data (e.g. matings/AI)
  - Calculate pregnancy rate and calving %
  - Calculate EBVs for reproduction
- BLUP and EBVs
  - Cow selection index (combining NB traits)
  - Within-herd EBVs
  - Merging with genetic information (GEBVs)

# National average ICP of herds in the Scheme





# National average 205-day weight of herds in the Scheme



Thank you