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Ethiopian Institute of Agricultural Research (EIAR)



Dairy cattle crossbreeding program in Ethiopia

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Presentation outline

- Introduction
- Objective (s)
- Cattle breeds of Ethiopia
- Dairy cattle crossbreeding effort in ETHIOPIA
- Summary of results
- Challenge/constraints
- Opportunities



Introduction

- In response to increasing population, rising income and urbanization, the demand for milk is growing in Ethiopia.
- Though the demand for dairy products is increasing, the dairy sector is currently unable to supply adequate products to satisfy this demand; this is mainly due to **the low productivity** of dairy animals.
- There are about 58 million cattle in Ethiopia of which **1.2 million crossbred dairy** cattle
- About **27 indigenous** cattle breeds, **2 exotic cattle** breeds and crossbred dairy cattle is used for milk production in Ethiopia.



Introduction cont'd

- About 11 million milking cows (CSA, 2016) in the country and 99 % are indigenous type (CSA, 2011).
- The dairy sector is characterized by **subsistence-oriented production**,
 - ✓ low use of technological inputs and
 - ✓ underdeveloped markets for inputs, services and outputs
- Despite large cattle population (about 58 million heads) and favorable climatic conditions, the self-sufficiency in milk production was not yet attained in Ethiopia.



Introduction cont'd

- Per capita consumption is about **16-19 kg** (Getnet, 2009; CSA, 2010) which was much below the average milk intake (FAO standard requirement) to be maintained for balanced diet.
- The country milk import was also increased from **3.1 million USD to 9.3 USD** from 2001-2008 years (Getnet, 2009).
- This is mainly due to poor productivity of indigenous cows and low success rate of genetic improvement.



Introduction cont'd

Reasons for the low productivity include:

- under-nutrition and malnutrition;
- high prevalence of diseases;
- poor genetic resource management and
- poor market infrastructure.



Introduction cont'd

- To overcome the development constraints and realize the benefits from the huge yet untapped livestock resource, considerable efforts have been made.
- Genetic improvement of dairy cattle has been mainly focused on cross breeding in order to combine high milk yield potential of exotic breed with adaptive potential of local breeds.



Objective

- ❖ Increase productivity of indigenous cattle breed, milk and milk products through crossbreeding with exotic dairy cattle breeds

Cattle breeds of Ethiopia

Class	Breed or Population
Humpless Brachyceros	<ul style="list-style-type: none"> • Sheko (Mitzan, Goda)
Hamatic Longhorn	<ul style="list-style-type: none"> • Kuri (Kouri)
Zebu	<ul style="list-style-type: none"> • Arsi • Barka (Begait) • Borana (Boran) • Arab (Adeni, Berbera, Bahari) • Shorthorn Zebu (Harer) • Highland Zebu (Bale) • Black Zebu (Jem-Jem) • Small Zebu (Jijjiga)
Sanga	<ul style="list-style-type: none"> • Danakil (Raya, Kereyu, Afar) Raya Azebo, Abigar (Nilotic)
Intermediate	<ul style="list-style-type: none"> • Horro •
Sanga/zebu	<ul style="list-style-type: none"> • Horro • Fogera (Wagera) • Arado • Jiddu • Fellata (Red Bororo)

Dairy cattle crossbreeding effort In ETHIOPIA

- The modern dairy production in Ethiopia was started in 1950s
 - when 300 Friesian and Brown Swiss dairy cattle received as donation from the United Nations Relief and Rehabilitation Administration (Mohamed et al., 2004).
- Crossbreeding for dairy cattle improvement in Ethiopia was initiated in the early 1950s.
 - Using improved dairy cattle breeds and its associated technological packages,

Dairy cattle crossbreeding effort In ETHIOPIA cont'd

- Crossbreeding work by Chilalo Agricultural Development Unit (**CADU**), Arsi Rural Development Unit (**ARDU**) in Arsi and Walayta areas have significantly contributed for expansion of dairy farming in Ethiopia.
- Crossbreeding research based on testing the performance and adaptation of crossbred of
 - three indigenous cattle breed (Borna, Horro, Barca/Begait) with
 - HF, Jersey and Simental was done in the central highland (Holetta), mid altitude (Bako), low land (Werere) and Rift valley (Adami Tulu) and demonstration conducted by Ethiopian IAR, at 4 locations

Dairy cattle crossbreeding effort In ETHIOPIA cont'd

- National Artificial Insemination Center and other organization have significantly contributed for expansion of dairy farming in Ethiopia.
- Dairy development efforts carried out by:
 - ✓ Dairy Development Agency (DDA) established by government of Ethiopia,
 - ✓ production of pure exotic breed/crossbred contributed to expansion of dairy breed in **Addis Ababa milk shade**
- Higher learning institutes such as Haremaya university, agarfa college etc

Dairy cattle crossbreeding program

Breeding program	location	objectives
Fogera cattle genetic improvement	Western Ethiopia Amhara region	<ul style="list-style-type: none"> • Crossbreeding with HF * for milk production • Conservation of pure Fogera and • Increase milk production of Fogera breed through pure breeding and Community based breeding
Holetta Research center crossbreeding Borena cattle with HF	Central Ethiopia, Holetta	<ul style="list-style-type: none"> • Evaluation of different crossbred animal for milk production, reproduction adaptation • Increase milk production through crossbreeding, • Production of selected crossbred bulls for AI, • demonstration and pre-scaling up F1 & 75% females
Adaberga Jersey cattle breed improvement pure breeding of jersey cattle	Central Ethiopia, Adaberga	<ul style="list-style-type: none"> • Increase milk production through pure breeding • Production of pure breed Jersey bulls for AI and NM
Debre Zeit Research center herd crossbreeding HF with local Borena Cattle breed	Central Ethiopia, D/zeit	<ul style="list-style-type: none"> • Evaluation of performance of high grade dairy cattle for Increase milk production and reproduction
development of composite breed HF* Arsi breed	Adami tulu research center	Development of composite breed from two breed crossing

Indigenous cattle breed improvement

Breeding program	location	objectives
Borena cattle breed improvement and conservation ranch	Didu Tuyra in Southern Ethiopia Oromia region	<ul style="list-style-type: none">• Production of pure Borena cattle• conservation of Borena breed
Begait cattle breed conservation and improvement	Humera North western Ethiopia Tigray Region	<ul style="list-style-type: none">• Production of pure Begait and• HF* Begait crosses for milk production• Distribution of F1 females
Fogera cattle breed improvement and multiplication	Chagni Western Ethiopia Ahmara region	<ul style="list-style-type: none">• Production of pure Fogera and• HF* Fogera crosses for milk production
Horro cattle breed improvement ranch	Oromia region, horro guduru district	<ul style="list-style-type: none">• Production of pure horro cattle and• Jersey*horro cattle crossbreeding for milk production



Crossbreeding program by CADU and WADU

Breeding activity

Breed used;

- Exotic breed; HF and Jersey
- Indigenous breed; Arsi and zebu breed

Objectives

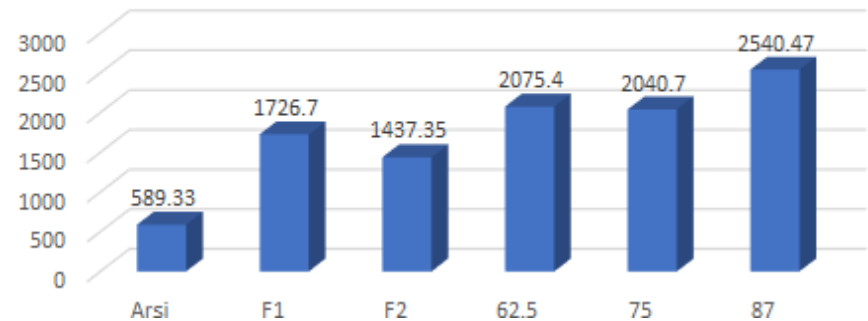
Increase milk production

Results of crossbreeding

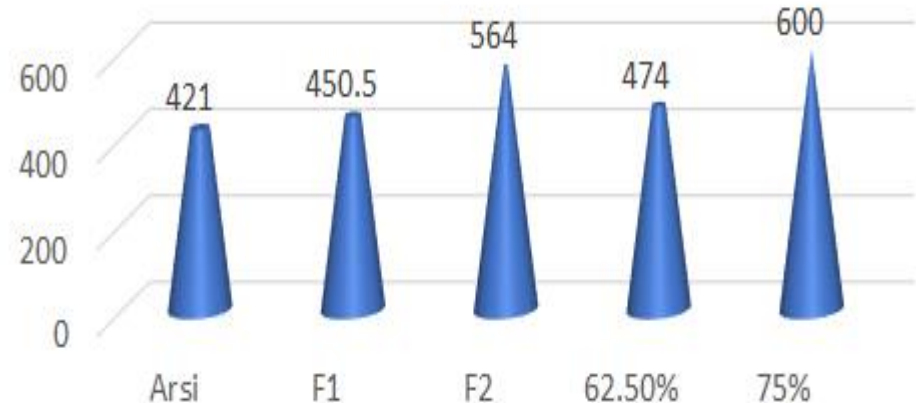
- Increased milk yield production up to 50%
- Declined milk yield from F1-F2 inter se mating
- Longer Calving interval for grade and F2 breed

productivity

Arsi-HF



Arsi-Jersey (CI days)





Crossbreeding program under IAR

Breeding activity

Location

- Holetta Research Center representing highland
- Bako Research Center mid altitude
- Adami Tulu Research Center represented semi arid zone(SM1).
- Melka Werer Research Center Melka Werer Research Center

Breed used;

- Exotic breed; HF, Jersey, Simental
- Indigenous breed; horro, Barca, Borena breed

Objectives

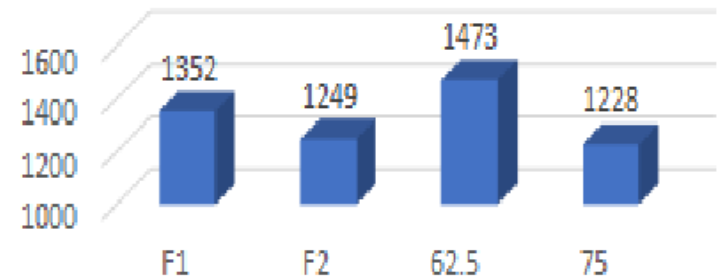
Testing the performance and adaptability of different breeds

Results of crossbreeding

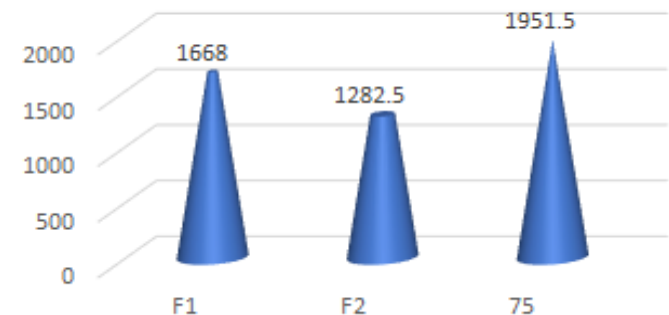
- The final conclusion from IAR research result showed that Friesian, Simmental and Jersey crosses with exotic inheritance of 50 to 62.5% are

productivity

Horro-Jersey



Horro-Simmental





Fogera cattle crossbreeding program

Breeding activity

Location

- Wester Ethiopia, Andasa

Breed used;

- Exotic breed; HF
- Indigenous breed; Fogera cattle breed

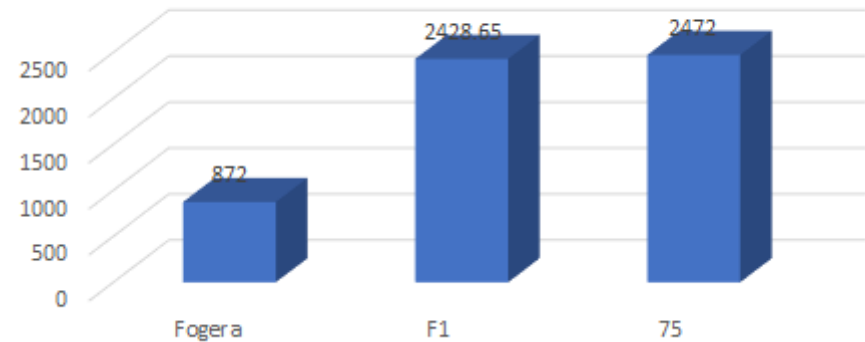
Objectives

results

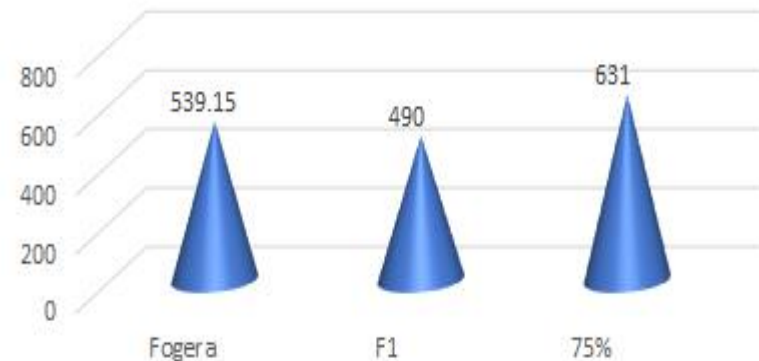
An increase in annual milk yield by 300% in F1 crosses as compared to Fogera was observed (Goshu and Mekonnen, 1996).

productivity

Fogera-HF

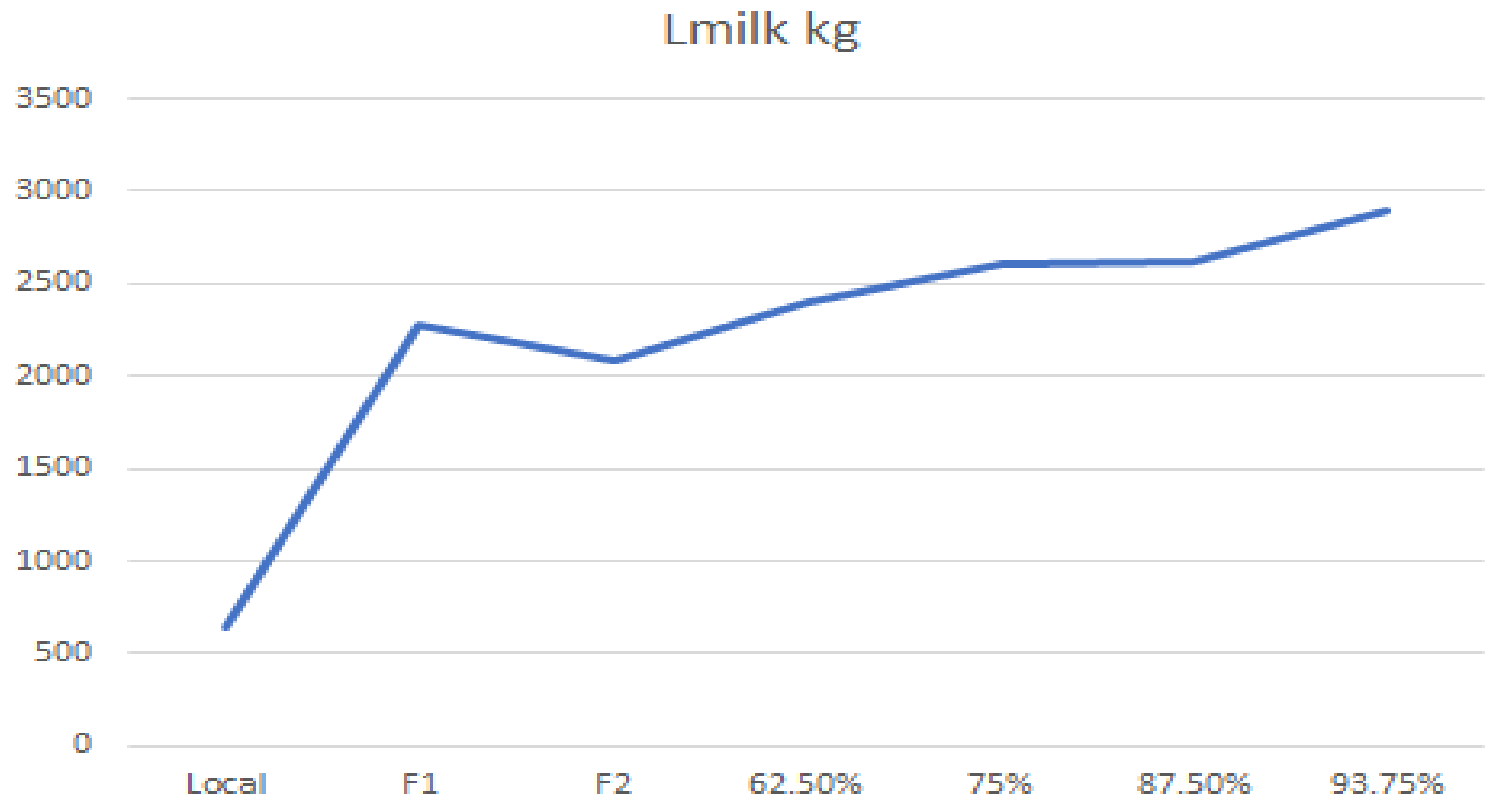


Fogera-HF (CI days)



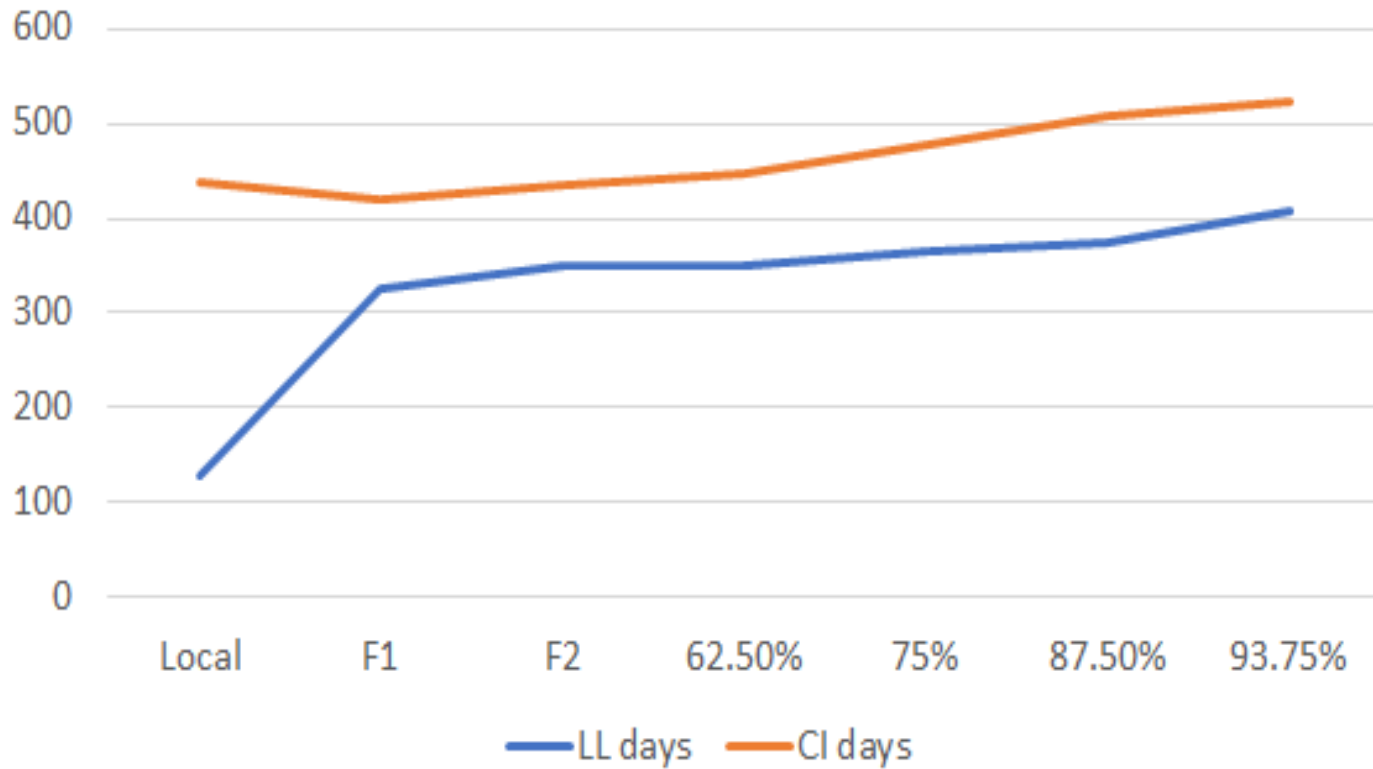


Over all performance of crossbred in Ethiopia





Over all performance of crossbred in Ethiopia cont'd





Summery of results

- The final conclusion from IAR research result showed that **Friesian**, **Simmental** and **Jersey** crosses with exotic inheritance of 50 to 62.5% are appropriate for smallholder dairy production in Ethiopia (Beyene, 1992).
- In a comparative study at Gonder Research Station the total lactation yield of **Fogera** and their crosses with Friesian was **872, and 2472** kg, respectively.
- An increase in annual milk yield by 300% in F1 crosses as compared to Fogera was observed at Gonder Research Station (Goshu and Mekonnen, 1996).
- Studies on **Borana** and **Horro** cattle revealed the suitability of indigenous cattle for crossbreeding for dairy production. The general conclusion is that the difference among *Bos indicus* breeds in Ethiopia for crossbreeding seems to be insignificant (Kiwuwa et al., 1983; Beyene, 1992). However, the breeds considered in both studies are few to reach final conclusions.



Summery of results cont'd

- Study at Alemaya University of Agriculture (Wells et. al., 1969) and Jersey cattle at Ada Berga state farm (Yimam, 1994) indicated a loss due to **abortion**, **stillbirth** and **disease** of up to 62% in animals born in Ethiopia.
- These indicated that dairy production based on pure temperate cattle breeds in Ethiopia is difficult if their survival and reproductive rate cannot be improved considerably.
- Similarly several workers (Brännäng and Pearson, 1990; Beyene, 1992) showed that when the level exotic breed inheritance increases beyond 50% level there is reduction in productive and reproductive performances, and survival rates. The incidence of abortion is also the major problem.
- Another important result obtained from the study at IAR is that reproductive, milk yield, survival and growth of progeny from inter se mating of F1 temperate-Zebu crosses is rather poor (Beyene, 1992).



Challenge/constraints

- Lack of genetically improved animals is a key constraint in dairy sector development indicated by low number of genetically improved dairy cattle in Ethiopia, for instance Kenya has around 10 % more crossbred dairy cows than Ethiopia.
- Lack of application of improved breeding technologies such as, Biotechnology tools
- Lack of input supply for breed improvement such as semen from proven bulls, feed, drugs
- Lack of infrastructure in breed improvement, such as semen processing laboratory, LN plant supply.
- Animals are not identified and farmers do not keep records of any herd.
- Livestock marketing
- Dairy policy and institutions; such as land tenure policy, taxation policy, pricing policy, and other policies,



Opportunities

- Suitable agro-ecologies favoring dairy production
- Presence of large number of cattle adapted to different agro-ecologies
- Current demand for milk and milk products is becoming high
- Government focus on livestock development is encouraging
- Master plan
- GTP-2 Plan
- Breeding policy
- Establishment of National Genetic Improvement Institute



**Thank
You**