Sheep and Goat Research and Development of Ethiopia

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Outline for the national sheep and goat research

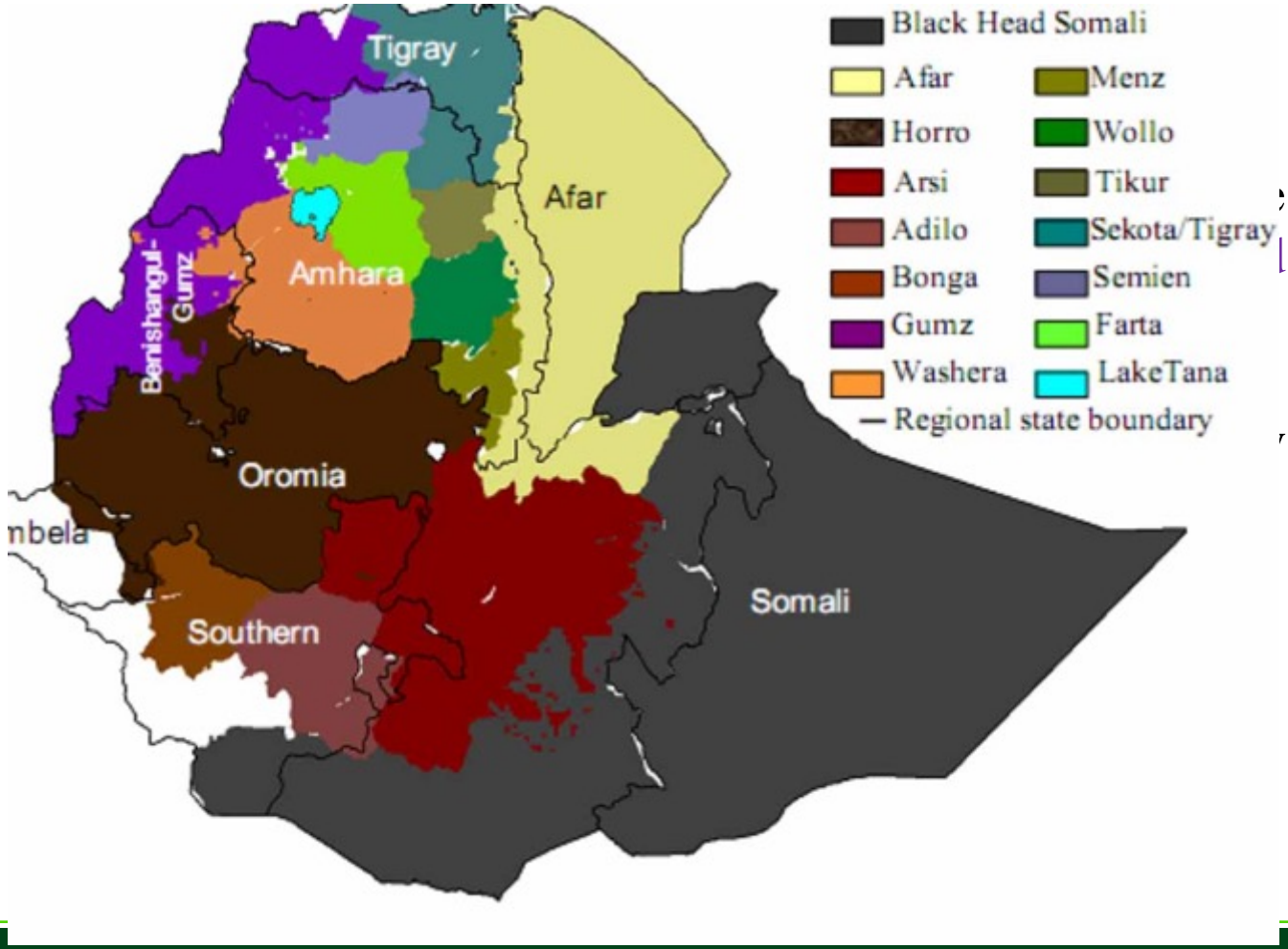
- Introduction
- Resource base and contribution
- Small ruminant research focus areas
- Summary of national research activities (breed improvement, feeding, health, market linkage)
- Overview of small ruminant CBBP research in the country (consider some CBBP sites: no of farmers, cooperatives, animals in CBBP, major achievements and so on)
- Challenges and options
- Future direction

- The human population of Ethiopia by the down of 2017 is estimated to pass the 100 million mark (FAOSTAT, 2017).

- The projected human population is estimated at 106 and 129 million in 2020 and 2030, respectively. According to FAOSTAT (2017), 80.5% of the population are rural dwellers.

  ✓ Feeding this huge population sustainably could be a great challenge for the nation!!

Sheep Genetic Resources – Geographic distribution



Resource base and contribution…

- In Ethiopia, SR have national importance as they provide for about 46% of the national meat consumption and 58% of the value of hide and skin production (Kassahun et al., 1991).
- Sheep and goat are **reared in all agro ecologies** of the country
- provide multipurpose roles including lower feed costs, quicker turnover, easy management and appropriate size at slaughter (Wilson 1991; Abegaz 2002; Donkin 2005).

Resource base and contribution…

- Almost all the indigenous sheep and goats breeds in Ethiopia are primarily owned and managed by **resource-poor smallholder** farmers and **pastoralists** under traditional and extensive production systems.
- The population of sheep and goats in Ethiopia has been in increasing trend.
- According to CSA (2015) the total sheep and goat population in Ethiopia estimated at 58.4 million where 29.3 are sheep and the remaining 29.1 is goats.

Research and development efforts

- **productivity per animal is not showing improvement.**
- reporting the **low production and productivity** performance of Ethiopian sheep and goats is almost common.
- about 10 kg per slaughtered of carcass weight from sheep was reported (FAO, 2009).

Research and development efforts…

- Various attempts have been made to improve the productivity of SR in Ethiopia where the majority of the efforts were tended to improve the productivity through **cross breeding**
  - The performance of (F1) generation from exotic breeds and the indigenous sheep breeds were variable.
  - In fact, there are areas where the crosses performed and failed
    - **Success stories in south Wollo chiro district is one example**

Small

VISION

By 2030, the traditional sheep production system in Ethiopia is transformed into a market-oriented, competitive and sustainable production entity that meets the domestic and export market supply chain requirements, consumer and community expectations.

- a, three

standard improvement strategies were identified including improved genetics, health and feed investment priority interventions, in livestock sector of the

MISSION

Deliver sound and scientific solutions and services in partnership with producers, Federal and Regional agricultural research centers, higher learning and international institutions to enhance the performance and efficiency of the sheep product value chain in Ethiopia.

- also in

reas)

- Breeding and genetics
-
-
-
-
-
-

GENERAL OBJECTIVE

Generate and promote knowledge, information and technologies to improve the productivity, product quality, profitability and sustainability of the sheep product value chain and increase its contribution to household and national food security and economic growth while safeguarding the environment.

Small ruminant research focus areas

- These intervention strategies were believed to improve the production and productivity of livestock sector (Shapiro et al., 2015).
- The genetic improvement strategy for the small ruminants, in the LS development master plan was suggested to be through:
  - investing in genetic selection
  - reduction of mortality in the young and adult
    - **Vaccination and parasitic control programs**
  - Securing the availability of sufficient quality feed

Summary of national research activities

- SR research and development in Ethiopia date back to the early 1960's while goat research has started by mid 70's
- More research focus on sheep than goats
- Research has gone through various stages of transformation
- Strategy/agenda, approaches, methodologies and organizational structure
  Breeding programs have shifted from
  - ✓ **central nucleus schemes**, where breeding objectives are set by researchers, to
  - ✓ **village-based breeding**
- crossbreeding was the major pathway followed by pure breeding

Community based indigenous Sheep and goat improvement program

- Abergelle goat CBBP-Tigray
- Abergelle goat CBBP/ Amhara
- Doyo Gana sheep CBBP: South
- Bonga sheep CBBP: South
- Washera sheep CBBP- (EIAR-ARARI-Supported)
- Menz sheep CBBP-EIST/ARARI-ICARDA
- Horro sheep CBBP-Oromiya-ICARDA
- Konso/Woyto-Guji CBBP:
- Black head ogaden sheep CBBP-EIAR supported
- Dauro sheep CBBP-Supported by EIAR-South
- Central highland goat (Minjar, Merhabete) EIAR-supported
- CHGoats/ West Shewa, Gondar, south Wello/LIVES
- Afar sheep CBBP-Afar (EIAR-Supported)
- Atsbi CBBP
- Borana Goat?

On-Station genetic improvement programs of sheep and goats

- Menz sheep
- Horro Sheep
- Begait sheep (Humera)
- Afar sheep (Afar)
- Abergele Goat
- Arsi Bale Goat (Adamitulu)

Some of the breeds to **Begin** the CBBP:

- Begait sheep CBBP
- Sekota sheep CBBP
- Siemen sheep CBBP
- Gumuz sheep CBBP
  - None of them secured budget

Overview of small ruminant CBBP research in Ethiopia:

Experiences form pilot CBBP-in the country

Community Based Bonga Sheep Breeding Program/CBBSP/




Overview of small ruminant CBBP research in Ethiopia:

Bonga

Experiences form pilot CBBP-in the country …

- Bonga sheep is one of the indigenous sheep breed
- Better growth and twinning rate
- Considerable **within breed variability** encouraging selective breeding.
- CBBP was started in two communities:
  - ✓ Boka and Shuta
- "**Boka-Shuta** Best Bonga Sheep improvement and multiplication cooperative" was organized by 2011

Overview of small ruminant CBBP research in Ethiopia:

Bonga

Experiences form pilot CBBP-in the country …

- The best practice of Boka –Shuta CBBP and trends were out scaled to 15 communities
- Thus, currently we have 17 CBBSB cooperatives/community
- Permanent data collectors were assigned in each site with initial monthly salary of **2,008** Birr
- For information sharing, farmers were organized in to small group with one representative (1:10) within community

Overview of small ruminant CBBP research in Ethiopia:

Bonga

Experiences form pilot CBBP-in the country …

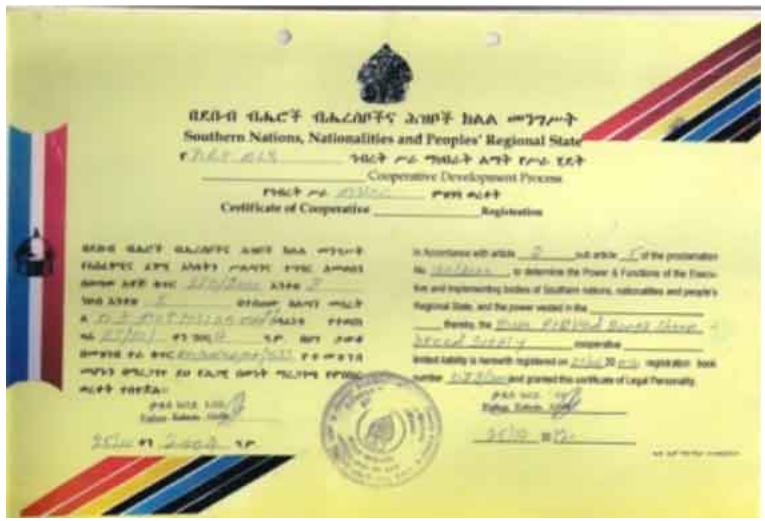
- Two steps in selection
  - ✓ 1st step Pre-selection (screening lambs for Selection) at 3 month
  - ✓ 2nd step final selection at six month
- Accordingly, from Boka-Shuta,
  - ➢ 16th Round selection was done
  - ➢ 1178 Breeding Rams were selected
  - ➢ **978** Rams were disseminated to different regions of Ethiopia

Overview of small ruminant CBBP research in Ethiopia:

Bonga

Experiences form pilot CBBP-in the country …

- Each cooperatives were organized according to cooperative and research principles
- Each cooperative have 5 committee Consists a total of 19 members
- Farmer who is a member of cooperative had at least 3-5 breeding ewes



Overview of small ruminant CBBP research in Ethiopia:

Bonga

Experiences form pilot CBBP-in the country …

- Farmer who is a member of cooperative got benefit 3 times from his sheep sold
- Cooperatives was audited every year
- According to 2017/2009 E.C Auditing Report from Boka- Shuta,
  - ✓ 278 members was divided 81,569.5 birr
  - ✓ Farmers got minimum158 and maximum 2581 birr from dividend
  - ✓ Cooperative have cash 900,000 birr on bank
  - ✓ Capital 1.22 million
- **We are working to get Bonga sheep Brand from science and technology**

Overview of small ruminant CBBP research in Ethiopia:

Bonga

Experiences form pilot CBBP-in the country …

YEAR	BWT	3MWT	6MWT
2009	3.88	14.0	19.4
2010	3.63	14.6	19.1
2011	3.45	13.5	20.6
2012	3.37	14.4	20.9
2013	3.62	14.1	18.9
2014	4.00	**15.4**	**21.3**
P	**	**	**

Genetic improvement programs of Menz sheep: Lessons from elite nucleus flock and CBBP

Genetic improvement programs of Menz sheep:
Lessons from elite nucleus flock and CBBP

- Menz sheep is the smallest sheep breed of all breeds in Ethiopia
- The breed is adapted to harsh environment (Tepid, cool highland)
  - ✓ Sheep-Barley
- The breed is adapted to **low input systems** and is the result of natural selection
- Under farmers management system the breed demonstrated low in body weight parameters
- Improvement options so far suggested is recurrent selection and improvement in the production environment

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Genetic improvement programs of Menz sheep:
Lessons from elite nucleus flock and CBBP…

- Traits selected for improvement were body weight at yearling and greasy fleece weight

Two methods were employed

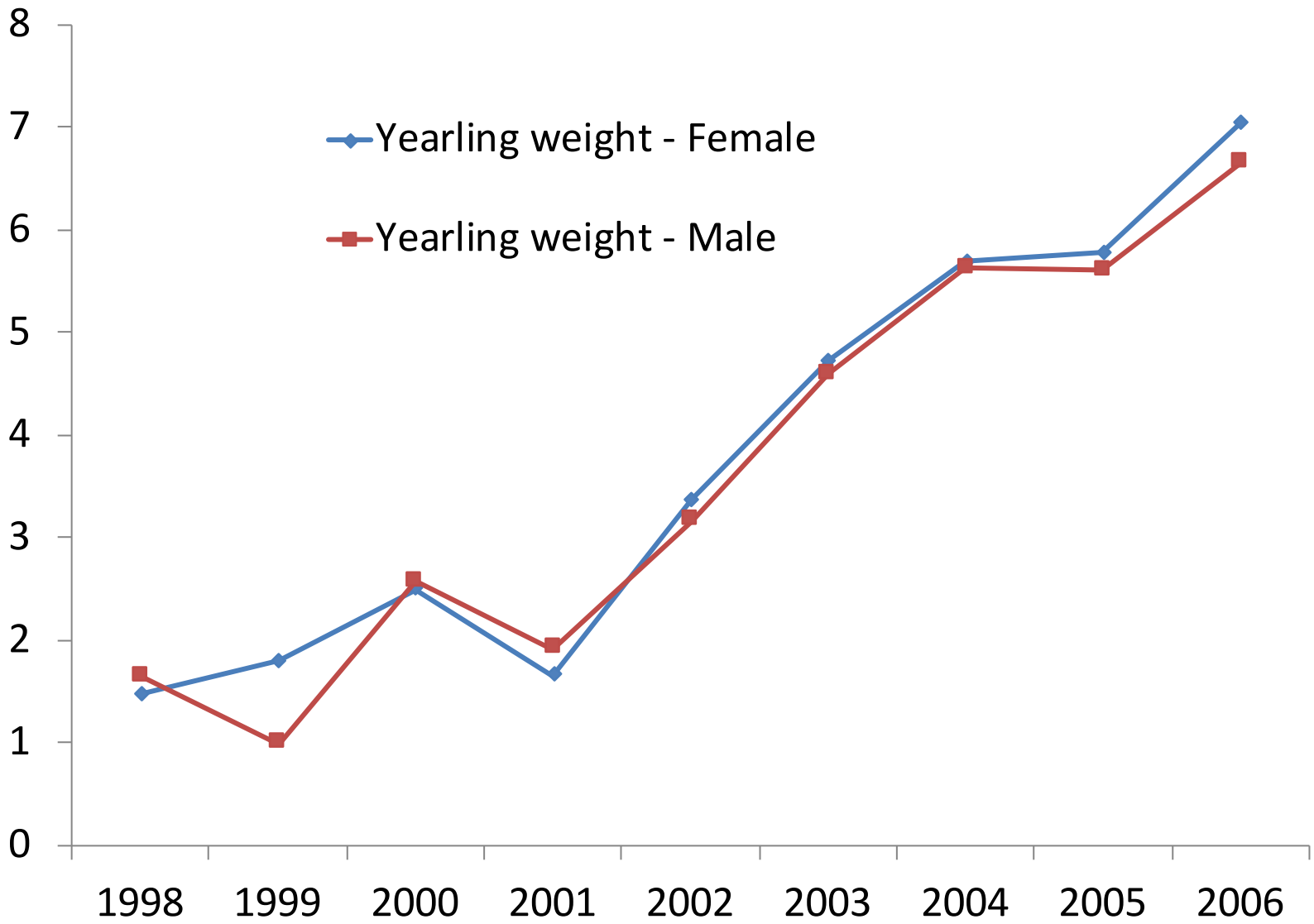
- Establishing and upgrading elite nucleus flocks of purebred indigenous Menz sheep- and linking to village breeding programs
- Developing community-based pure-breeding schemes and model breeding villages for Menz sheep (3+ 2 villages)

Genetic improvement programs of Menz sheep:
Lessons from elite nucleus flock and CBBP…

- **Improvement in body weight parameters was observed**
  - A considerable genetic improvement is achieved
  - Improved lambs through selection for high EBV attained 30 kg weight at yearling age when supplemented with concentrate feeds, while lambs with low EBV did not reach 30 kg weight
  - Establishment of elite flock at DBARC and dissemination of improved genotype in model villages is underway using best rams

Genetic improvement programs of Menz sheep:

Lessons from elite nucleus flock and CBBP…



Genetic improvement programs of Menz sheep:

Lessons from elite nucleus flock and CBBP…

Males (left) and females (right) at yearling age

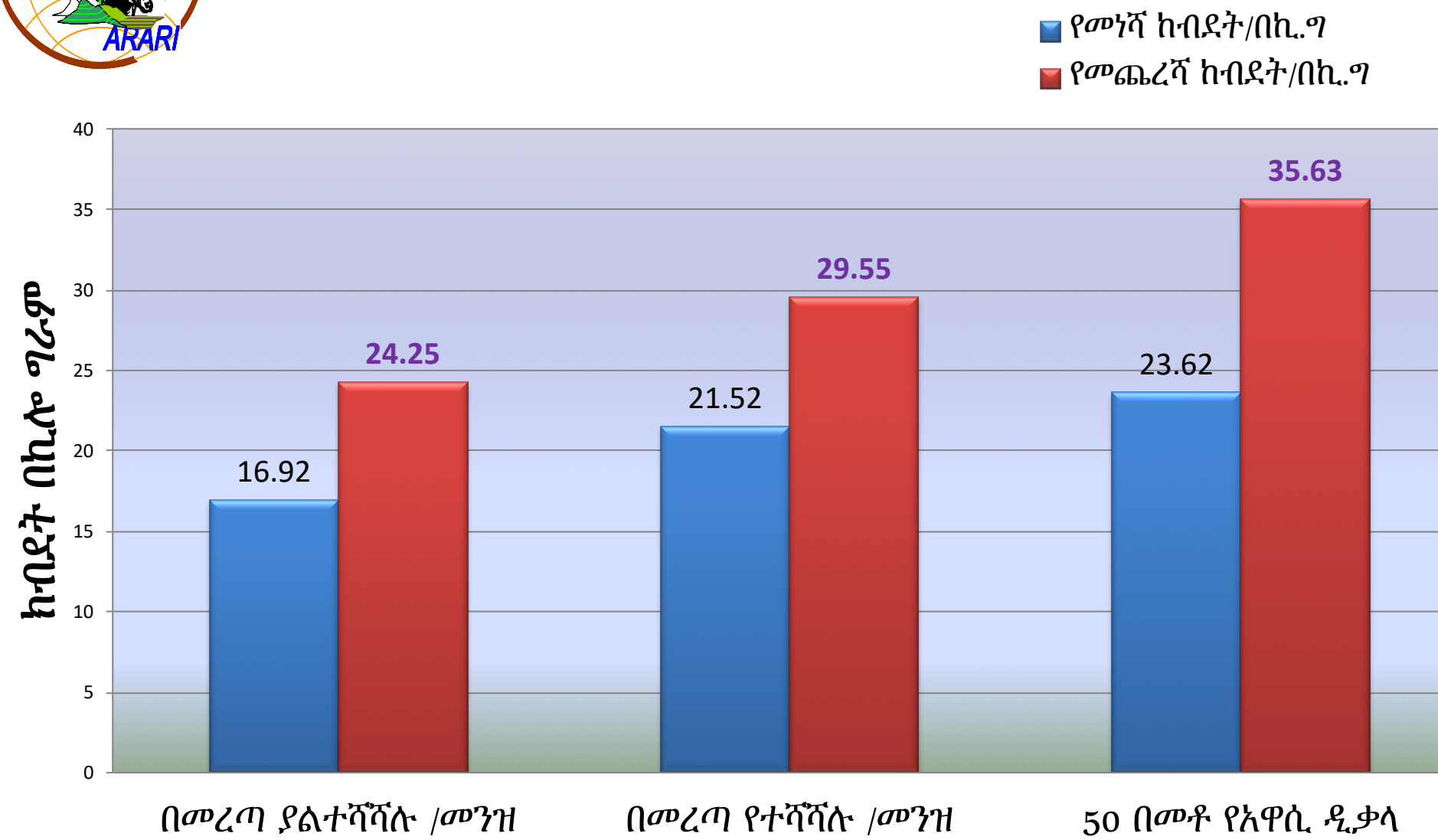
Mature Menz rams improved by selection for 8 generation

Menz sheep improved through selection

Genetic improvement programs of Menz sheep:

Lessons from elite nucleus flock and CBBP…

Respose of selected, unselected MENZ and cross bred ram lambs to 400g/h/d supplementation



Dissemination of improved genotype to village flocks

Discussion with participating farmers

Ram ranking by farmers

Dissemination of improved genotype to village flocks

Farmers discussing allocation of selected rams to farmers

Ram allocated to each group of farmers using lottery method

Community based genetic improvement for Menz sheep

Name of Village	CBBP's Established	No. of Participant HHs		No. of sheep currently under the CBBP
		M	F	
Sinanba	MM-Old	30	6	**2490**
Boda	MM-Old	24	3	
Zole & Keyafer	Molale-Old	46	6	**2567**
Tsehay-sina	MM-New	97	20	**2100**
04-Kebele	Molale-New	75	13	**1875**
Total		**272**	**42**	**9,032**

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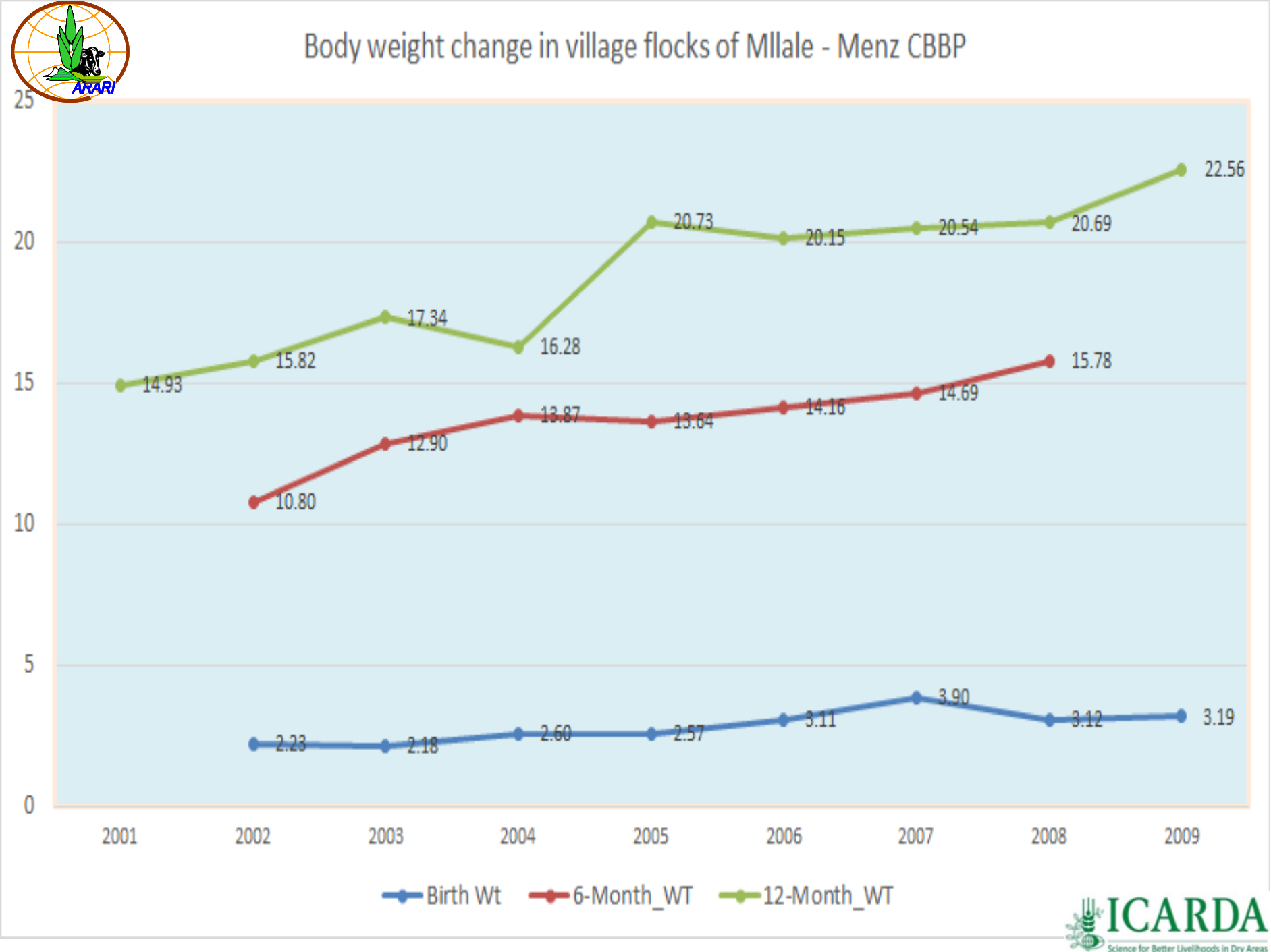
Body weight change in village flocks of Mllale - Menz CBBP
25
20
15
10
5
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
14.93
15.82
17.34
16.28
20.73
20.15
20.54
20.69
22.56
10.80
12.90
13.87
13.64
14.16
14.69
15.78
2.23
2.18
2.60
2.57
3.11
3.90
3.12
3.19
Birth Wt
6-Month_WT
12-Month_WT

Menz sheep is adapted to the low input system

Selected rams used as breeding rams in Menz villages

ARARI

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Experience sharing with different stakeholders

Meat, carpet wool and manure

Product

Meat

Menz sheep- By product

Horro sheep

- Potential indigenous sheep breed
- Prolific
- Within breed variability encourages recurrent selection

CBSBP…

- Community based breeding ram selection and communal use was targeted

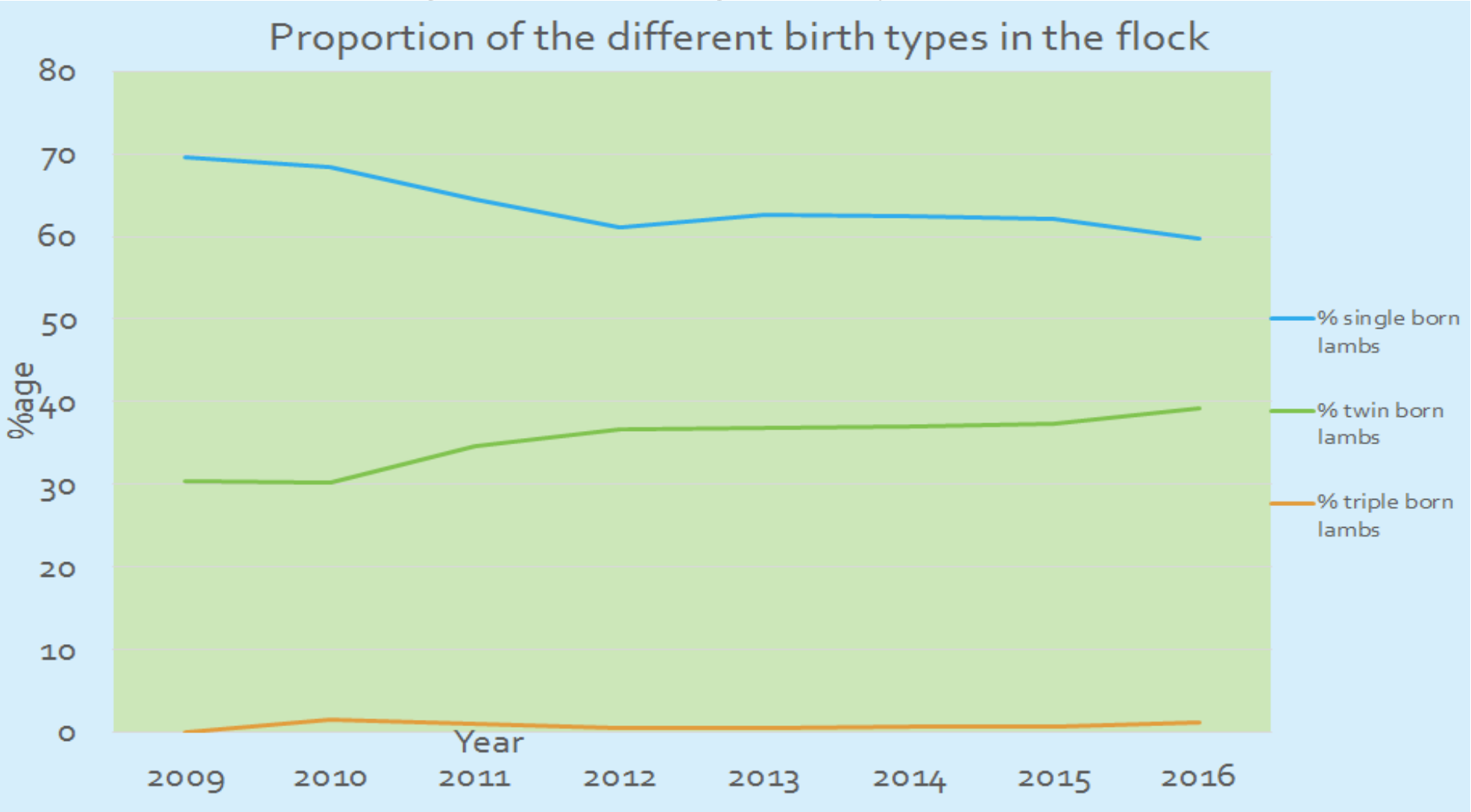
- The project was started in collaboration of OARI, ICARDA, ILRI and BOKU

- Two breeders' cooperatives established at Gitilo and Laku
- A revolving fund for breeding ram purchase was created to the coops

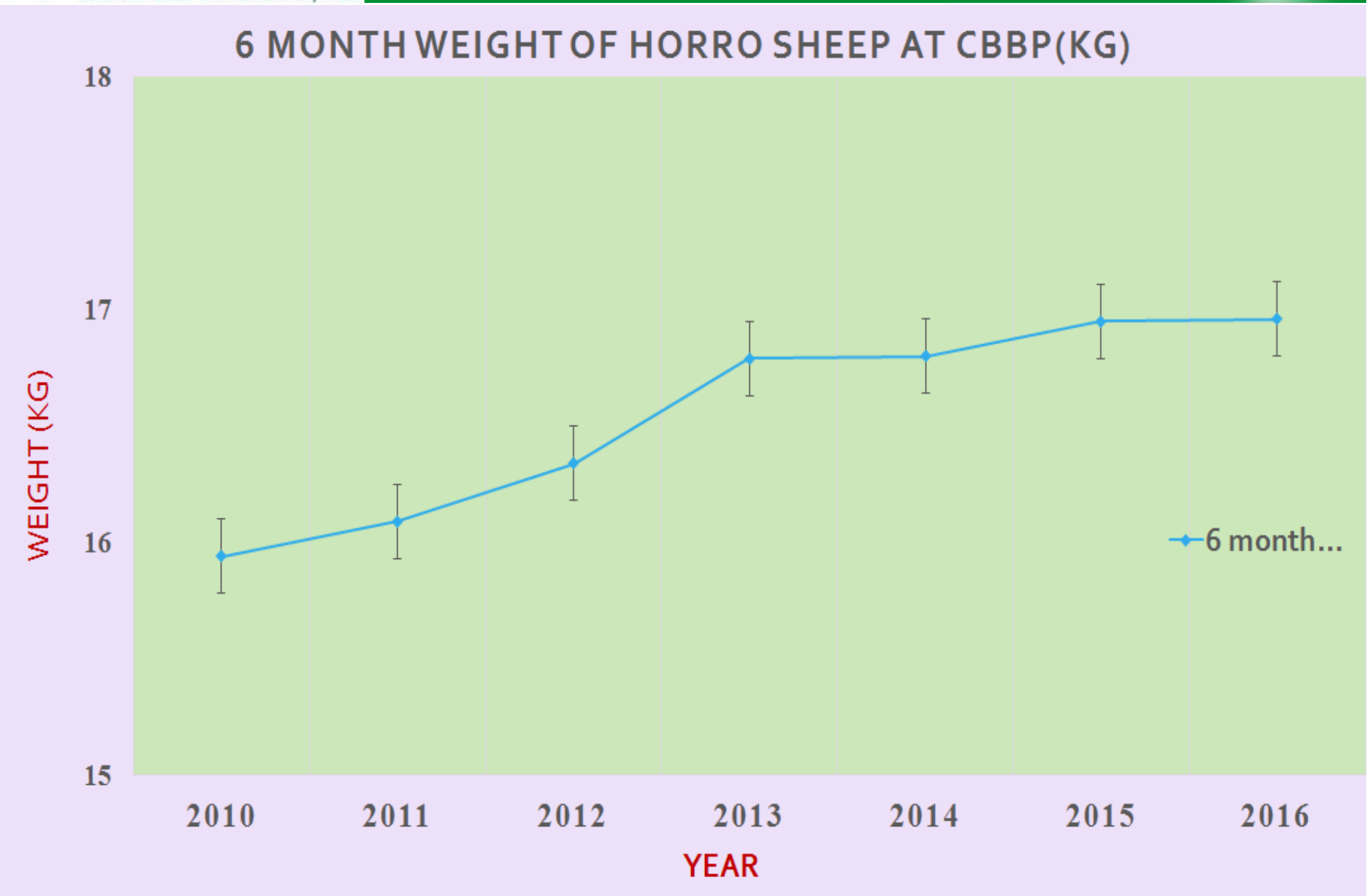
  ICARDA, OARI (Bako ARC)

CBSBP…

- More than 140 breeding rams have been selected in 11 rounds and used
- 28 selected breeding rams are serving currently



CBSBP…


6 MONTH WEIGHT OF HORRO SHEEP AT CBBP(KG)
18
17
16
15
WEIGHT (KG)
2010
2011
2012
2013
2014
2015
2016
YEAR
6 month…

CBSBP…

Doyogena sheep breed

- Potential indigenous sheep breed
- Prolific
- Within breed variability encourages recurrent selection

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Table 1. Current **Doyogena** Sheep breeding cooperatives and members available

Name of Cooperatives	Members		Total
	Male	Female	
Ancha Sadicho	136	18	154
Hawora Arara	134	29	163
Begedamu Geteme	55	7	62
Murasa Woyiramo	82	9	91
Sarara	91	14	105
Total	**498**	**77**	**575**

Table 1. Current **Doyogena** Sheep breeding Program status…

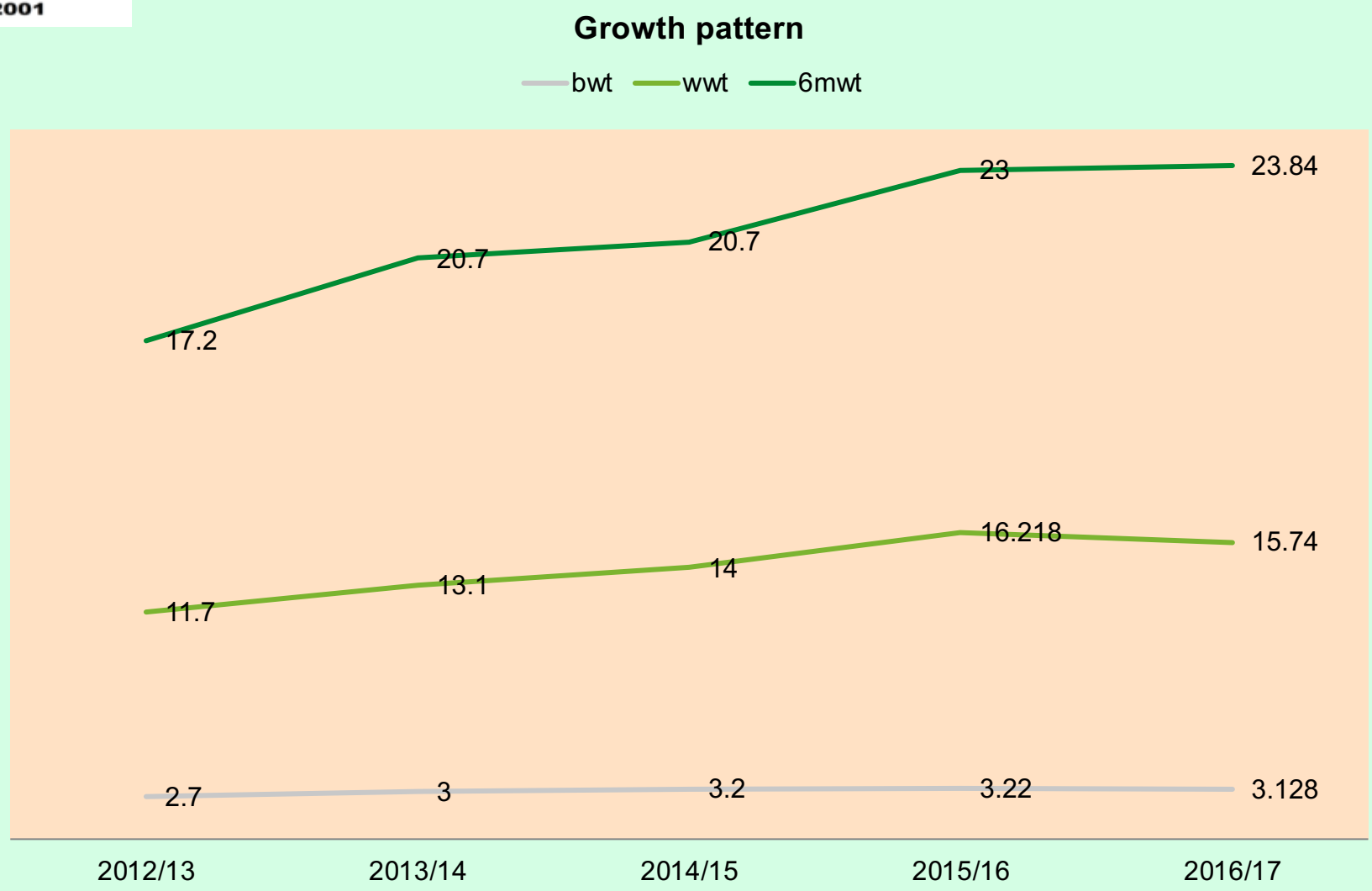


Table 1. Current **Doyogena** Sheep breeding Program status…

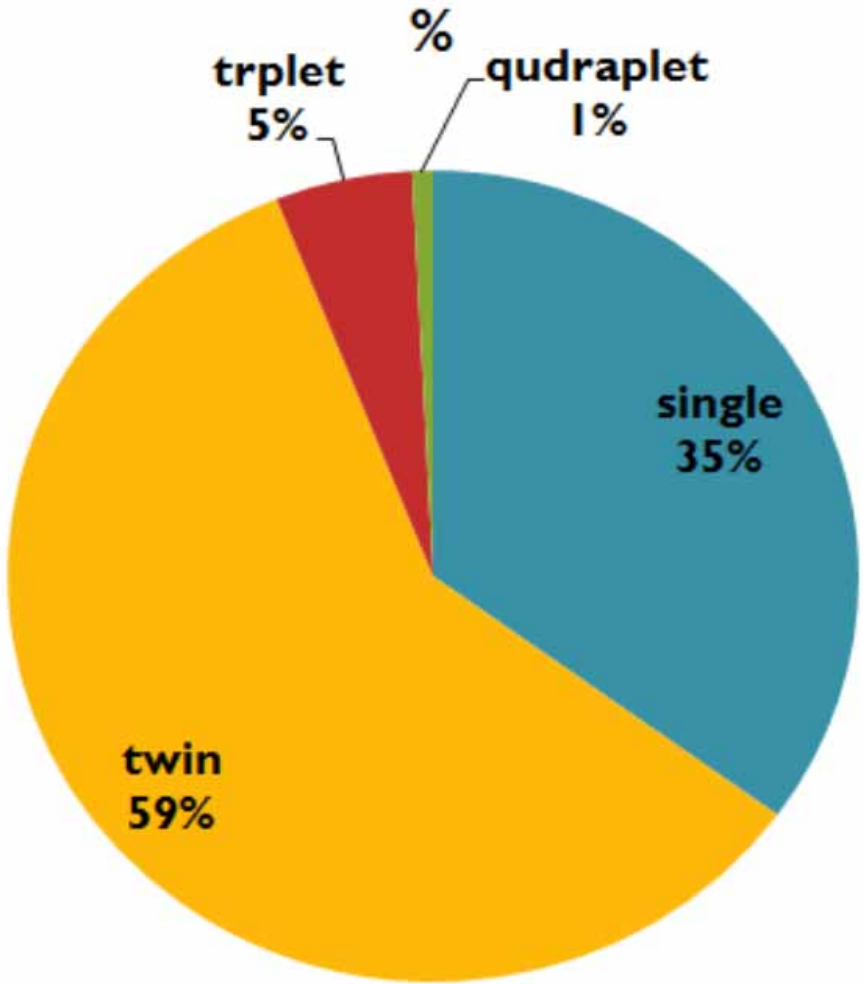


Fig 2: The prolificacy of Doyogena sheep

Dauro sheep breed

- Potential indigenous sheep breed
- Prolific
- Within breed variability encourages recurrent selection

CBSBP…

Washera sheep breed

- Potential indigenous sheep breed found in Norht western parts of the country
- Prolific
- Within breed variability encourages recurrent selection

CBSBP…

Washera sheep breed

- 74 farmers at Banja district was participating
- The groups are organized as Washera sheep breeders group as a cooperative.
- On top this, to establish **open nucleus herd**, land was requested at Awi zone administration and still there is a green light to have enough land for washera sheep sub-center establishment.

Table 1. Growth performance of wahera sheep at Banaja CBBP site

Parameters		Birth Weight			3 month weight			6 month weight			9 month weigh			12 month weight		
		N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Parity	1	10	2.40	0.51	5	11.00	1.00	1	29.00	.	2	16.00	4.24	1	22.00	.
	2	20	2.50	0.51	5	11.80	2.68	9	17.00	2.44	6	19.17	2.40	1	25.00	.
	3	37	2.35	0.48	14	10.50	2.50	19	17.95	3.25	8	19.88	4.88	1	30.00	.
	4	59	2.42	0.49	26	11.52	2.99	31	17.48	3.48	16	19.88	3.46	3	24.67	1.15
	5	59	2.56	0.50	31	11.42	3.27	31	18.32	3.67	20	20.05	3.92	3	27.00	1.00
	6	47	2.60	0.49	19	12.84	4.00	26	17.62	2.74	10	20.90	3.66	5	23.40	1.51
	Total	232	2.49	0.50	100	11.58	3.17	117	17.87	3.39	62	19.90	3.73	14	24.93	2.36
Sex	Male	102	2.50	0.50	39	11.39	3.07	46	18.24	4.05	25	20.04	3.98	6	25.67	1.63
	Female	137	2.48	0.50	63	11.75	3.21	75	17.60	2.84	42	19.67	3.80	8	24.38	2.77
	Total	239	2.49	0.50	102	11.61	3.15	121	17.84	3.35	67	19.81	3.84	14	24.93	2.36

Washera sheep breed

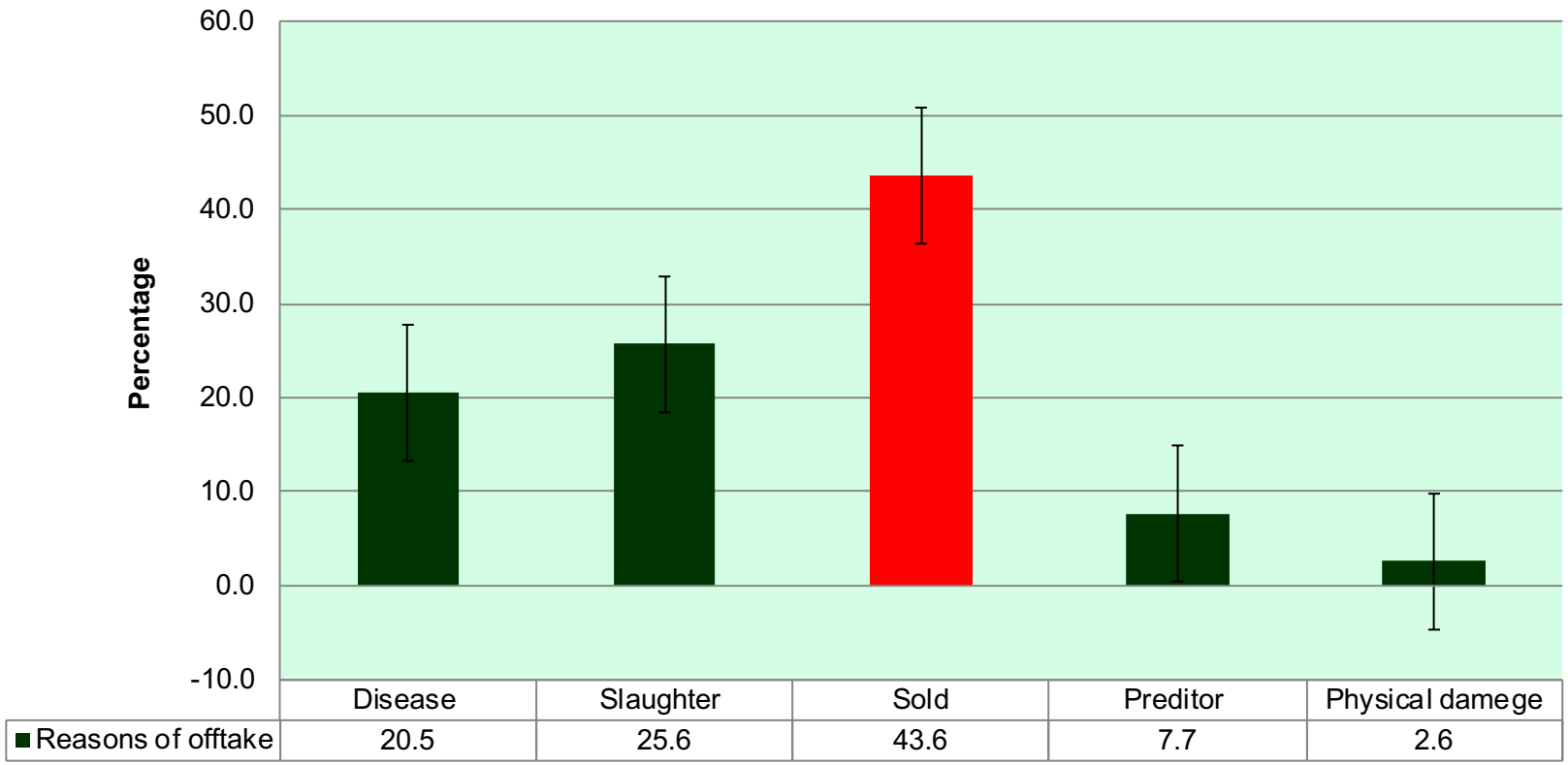


Figure 1. Reasons for avoiding/culled of sheep population in the farm gate

Abergelle Goat breed

- Distributed all over Waghimra zone, most parts of North western Tigray and borders of Gondar
- Very tolerant to feed scarcity with better temperament
- Play a very important role in HH income and are priority commodity in the lowlands of Wag-himra farming systems
- Contributes about 70% liquid cash income of the households in these areas (SDARC, 2016 unpublished)

Overview of Goat CBBP research in Ethiopia:

Experiences form pilot CBBP-in the country

- Lower live body weight
  - **1.98± 0.06** k.g birth weight
  - **7.30± 0.21** k.g weaning weight
  - **18.3** k.g mature weight

  lower litter size(1.04±0.2) and lower twining rate(3.4%)
- Longer kidding interval (324 ± 53 days)
- Longer age of first kidding (460 ± 55 days)
- Lower milk production (450ml/day)with shorter lactation length(8.8weeks)

Overview of Goat CBBP research in Ethiopia:
Experiences form pilot CBBP-in the country

- Breeding cooperatives were formed both at Amhara and Tigray Abergelle CBBP

- Based on their growth, milk yield of the dam and preference of farmers from the total **1132** male kids

  - about **75** kids (**bucks**) were selected for breeding purpose and distributed to the community.

- Due to selection the trend of growth performance and milk yield are positively increased compared with the base population.

Overview of Goat CBBP research in Ethiopia:
Experiences form pilot CBBP-in the country

Woyto-Guji Goat CBBP

- Woyto-Guji Goat Breed is Potential around South Omo,
- Farmers depend largely on goat (meat, income…)
- There is also high market demand at regional and local level
- High variation in productive and reproductive traits
- CBBP- was suggested for improvement

Woyto-Guji Goat CBBP

Doc ID

	Baide	Arfaide	Massoya	Tebela-Kuchale	Fetele	Jarso (New)	Remarks
Members	200	110	43	82	48	29	Updating
Selection Round	15	9	6	5	1	-	>>
No. of bucks sold	450	210	31	43	46	-	>>
Capital (ETB)	80,000	30,000	21,000	26,0000	18,000	-	175,000

Woyto-Guji Goat CBBP

Baseline Growth performance (Baide sample case)

	BWt	WWt	6MWt	YWt	Remarks
Overall (N=225)	2.18	7.63	11.52	19.11	Needs genetic potential exploitation
M	2.24	7.84	11.85	19.44	
F	2.09	7.27	10.94	18.52	
Min-Max	**1.05-3.25**	**4.55-15**	**6-17**	**12-28**	Variation is high (Selection is feasible)

Some of the New initiatives on CBBP

- The **Blackhead Somali sheep** Community Based genetic improvement Program
  - Recently started
  - In areas where irrigation is available to develop feed resources

Superior Breeding Rams grazing separately from their respective herd at Mara'ato (Breeding management)

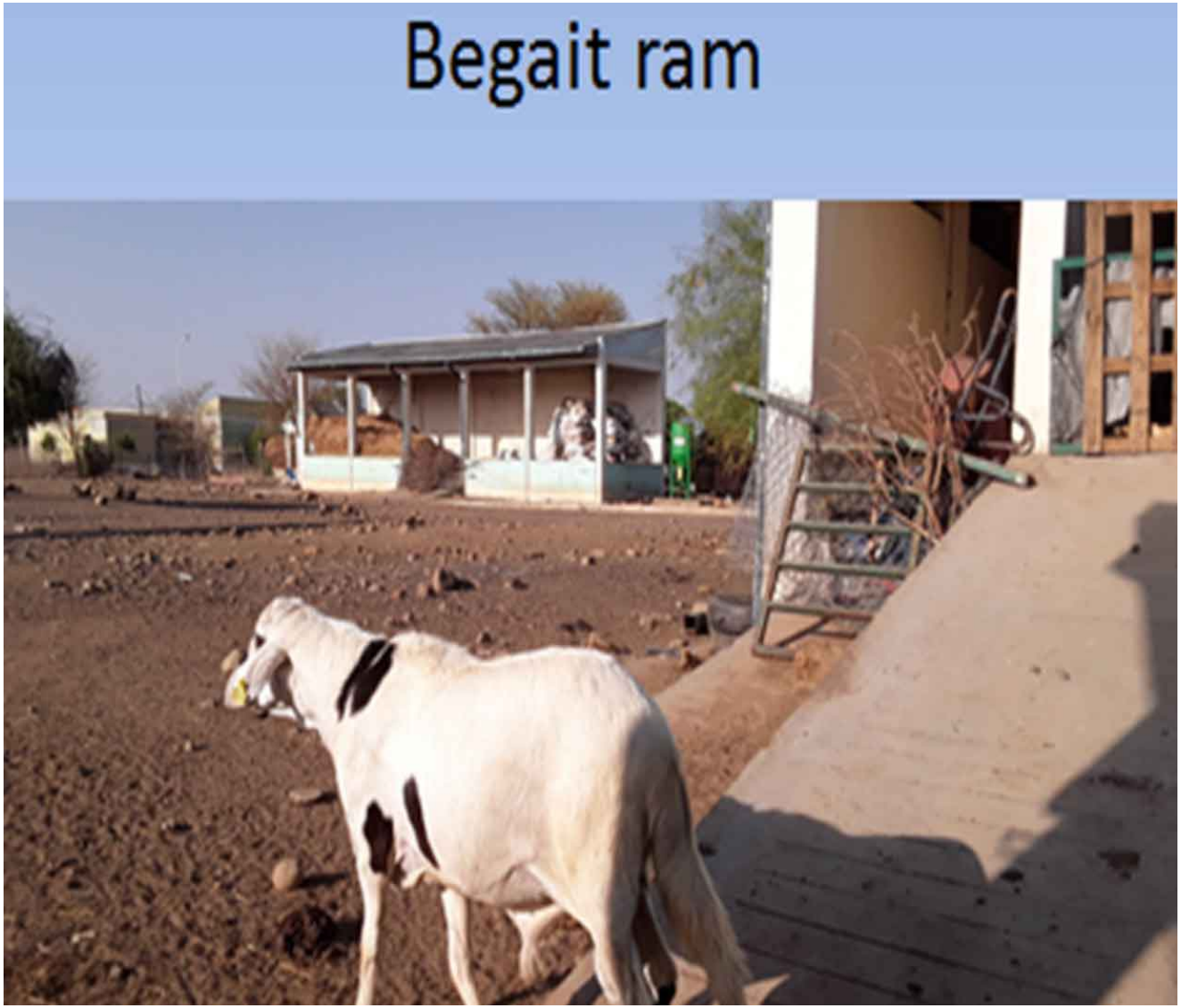
Some of the New initiatives on CBBP...

- The **Central highland goat** Community Based genetic improvement Program
  - Recently started
  - At Minjar-Shenkora
  - Merhabete
  - Bati






Some additional potential sheep breeds



Some additional potential sheep breeds

Felata breed at Guba area




Challenges

- Extreme delay in legalizing the cooperatives- licensing
- Poor linkage among the different stakeholders
- Genetic improvement through selection takes time and is not a one time event
  - ✓ Some times challenges come from officials
- Very limited capacity of most research centers including the coordinating center (Research inputs, vehicle for monitoring the activities…)==== Rough roads !!!
- National data base system is at its infant stage (we need to work to standardize, formation NdBS-)
- Drought in some places

Opportunities

- The presence of diverse sheep and goat breeds adapted to wide range of ecologies
- Considerable variability observed within the same sheep and goat breeds
- High demand of sheep mutton and goat meat both at domestic and export market
- Currently high Government focus on livestock
  - ✓ High ambition and stretched goals (Livestock master plan, GTP-II plan…)
- **Presence of strong partners like ICARDA-IFAD in the country focusing on SR productivity and enhancement of the pro-poor livelihoods**

Future directions:

- **Strengthening partnership** (EIAR- National, RARI's, Universities, CG-Group-ICARDA, MoLF-extension unit)
- **Develop CBBP working modalities and guide lines** as a PROTOCOL to follow
- Strengthening the old CBBP's and use them to generate additional knowledge (Consider them as a learning site to develop guide lines and fine tuning)
- Establish as many as new CBBP's on SR with involvement of all relevant stakeholders
- **Strengthen data collection methods and establish** NATIONAL DATA BASE SYSTEMS
- In place strong **monitoring and evaluation** methods and have NATIONAL ANIMAL SHOW AND AWARD-DATES, legalization of the coops

Farmer to farmer visit
(from West Shoa-farmers)