



REPORT

Building social networks and capacities for the scaling of small-scale mechanization in South Tunisia to improve feed and forage supply



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INITIATIVE ON
Livestock and Climate

1. Introduction

The livestock sector urgently needs to adapt to climate change while reducing its impact on the global climate system. Pastoral systems operating in drylands need to strengthen their resilience and reduce GHG. LCSR partners with public and private actors to develop and deliver actionable innovations that measurably help producers, businesses, and governments adapt LAFS to climate change and reduce GHG. LCSR will furthermore develop business models and co-create innovation packages for successful scaling of core innovations (WP3). The introduction of small-scale mechanization in Tunisia helps to valorize local by-products to produce compound feed, thus creating business, and reducing pressure on overgrazed pastoral land. To create the innovation package, composed of technical and organizational innovations, ICARDA is collaborating with the national research institute (IRA Medenine), livestock extension agency (OEP), different farmer organizations and a private actor (Juhaina – agricultural small scale machinery company).

The feed and forage situation in South Tunisia is worsening over the last decades. This is mainly due to climate change and drought. Farmers are partly abandoning rearing of small livestock due to lack of feed and forage resources or high increase in feed input prices, while the meat prices remain stable. Small livestock production becomes less and less profitable.

LCSR is tackling these challenges through the introduction of small-scale machinery. In particular feed choppers and grinders as well as feed pelletizers and feed mixers will contribute to the reduction of feed wastages and improve production and income of farmers. Locally available material is valorized in a more efficient way. These technologies will also contribute to reduce pressure on pastoral land and minimize overgrazing and soil erosion.

The initiative is collaborating with three farmer organizations (FOs) in the arid regions of South Tunisia, who are benefiting from small machinery and relevant feed producing trainings. In addition, the development of a regional living lab whereby the three FOs collaborate and exchange ingredients and technologies for mutual development is a long term strategy.

2. Supported farmer organizations

2.1 GDA Elmarai in Douz

The FO is based in Zaafran, nearby Douz and has about 150 members. It is at the edge of the Sahara desert and all farmers are using the irrigated oasis to produce crops and rear livestock. Only during good rainy seasons few grasses are produced in the desert, allowing ruminants to graze. But according to Mr. Hedi, the coordinator of the FO, that was last the case over five years ago. Farmers are relying on the products of the oasis to feed their sheep, goats, cows and camel. Most commonly they use downgraded dates and date kernels, and luzerne being produced in between the date palms or let the ruminants graze on uncultivated land between the palm trees. In addition, they buy hay and subsidized barley and wheat bran to feed their animals.



Figure 1: Small ruminants grazing between date palms (U. Rudiger 2023)



To tackle the challenge of reduced and expensive feed and forage supply, the GDA Elmarai, in collaboration with ICARDA and OEP (national livestock agency) has developed the feed pelletizing technology. Previous ICARDA initiatives (CRP livestock) have supported the FO through the donation of a mobile chopper and grinder and a large imported feed pelletizing machine. Capacity development activities and feed analysis were undertaken to develop the right feed pellet composition. Today the FO produces and sells two pellet types to its members. They call it “Youfeed”, which has the following composition:

Tab 1: Ingredients for two “Youfeed” formula

Ingredients	Youfeed 1 – general feed for ruminants – Percentage of ingredient	Youfeed 2 – for sheep fattening – Percentage of ingredient
Downgraded dates and kernes	30 %	20 %
Luzerne hay	25%	25 %
Barley	15 %	15 %
Wheat bran	26 %	26 %
Minerals and Vitamins	4 %	4 %
Faba beans	0%	10%
Protein content	10,7 %	13,8 %

The FO sells *Youfeed 1* at 37.5 TD (12.5 \$) per 50 kg bag and *Youfeed 2* for 50 TD (16.6 \$) / 50 kg. This includes a net benefit of 2,5 TD (0.8 \$) per kg. This compound feed competes with imported feed concentrates which are sold locally for about 70 TD (23.3 \$) / 50 kg. In eight months, (January to September 2022) over 35 tons “Youfeed 1” were sold to seventy FO farmers. The demand for “Youfeed 2” is significantly lower due to its higher price.

A major challenge for the FO has been the labor intensity to mix the feed ingredients. That has been done manually with a shovel and is very time consuming. As the demand for these nutrient rich and relatively inexpensive feed pellets in this large oasis is increasing, the LCSR has supported the FO with a feed ingredient mixer, having a capacity of 700 – 800 kg / h.



Figure 2: Farmer organization using feed mixer (U.Rudiger 2023)





Figure 3: Mohamed Saad, member of FO El Marai (U.Rudiger 2023)

The 65 year old member of the GDA El Marai, Mohamed Saad, cultivates 15 ha of irrigated oasis land and has about 150 heads of small ruminants. He grows Luzerne, dates and olives. Since pellets are sold by the FO he bought about 4 tons in total, 500 kg every month. He says: "Before the pellet were available, we gave the feed like wheat bran, hay and barley separately which required a lot of work. Now we give 15 kg pellets every morning and 30 kg in the evening for all 150 heads. We add only hay. The feed is well balanced and reduces workload. We have observed a faster growth rate; so for upcoming Aid festival we expect higher return and income". Mr Saad receives a quota of subsidized wheat bran and barley from the government via the FO El Marai. He now let's all his grains and bran with the FO for pellet production and buys the pellet in return for a cheaper prize of 20 TD (6,7 \$) instead of 37.5 TD (12.5 \$).

2.2 GDA Tamezret in Gabes

The farmer organization GDA Tamezret is based in a very arid region in South Tunisia with an average annual rainfall of less than 100 mm, spread over six months. This rainfall pattern doesn't allow any rainfed agriculture. Even livestock farming becomes a real challenge in this area leading to farmers abandoning that activity. To foster livestock and crop production the African Bank of Development (BAD) has granted a loan of 1.8 million TD (600,000 \$) to the Tunisian Government to install 50 ha of irrigated land. This project has been achieved in 2022 and a farmer group of 29 mainly young farmers has been created to manage



Figure 4: Members of farmer group (U.Rudiger 2023)



Figure 5: Irrigated tree seedlings (U.Rudiger, 2023)

this irrigated land. Each farmer of the FG cultivates 1.7 ha and has started producing trees. Over 11,000 different tree species, like almond tree, olive tree (local and imported varieties), fig trees, acacia and eucalyptus for wind brake have been planted since April 2022 on the 50 ha irrigated land.



Figure 6: Sorghum and luzerne for fodder (U.Rudiger, 2023)



Besides the production and commercialization of fruits, the GDA farmers want to develop forage production to guarantee feed supply and reduce production costs of their ruminants. In collaboration with OEP and local authorities they will obtain luzerne seeds to be planted in springtime. They plan to grow 30 ha Luzerne being intercropped between fruit tree lines. The leguminous fodder crop will be a perennial variety growing up to four years. The estimated production will be more than the FO members need, thus providing feed supply to other feed desperate farmers in the region. Having this additional forage crop available all year round will reduce pressure on nearby pastoral land which is already heavily overgrazed.



Figure 7: Mobile Chopper and grinder
(U.Rudiger, 2023)

Valorization of leaves and small branches as potential animal feed for small ruminants is another key activity to sustain animal production. The LCRS initiative has therefore donated a locally manufactured mobile feed chopper and grinder to be managed by the farm group. Once the luzerne fodder crops are established and luzerne hay produced, the chopper will be used to chop luzerne into small better digestible pieces which can easily be mixed with other feed to enrich feed quality and reduce wastage.

2.3 GDA Beni Khadeche in Medenine

The farmer organization GDA Beni Khedache has been supported by the FIDA funded project PRODEFIL. (Projet de développement agro-pastoral et des filières associées dans le Gouvernorat de Médenine). Their members are mainly engaged in livestock production. The farmer organization provides farmers with animal feed like barley and wheat bran. The newly constructed warehouse also serves as a stocking place for hay and straw to ensure access to basic feed for their members.

ICARDA is collaborating with this GDA and the supporting institute IRA Medenine since CRP livestock and now within the LCSR initiative. Different methods have been tested and evaluated to see how the pastoral land can be used in a more sustainable way. The availability of feed resources like wheat bran and barley as well as periodically olive cakes have motivated the farmers to test and get engaged with the innovative feed processing technology of pelletizing locally feed to produce and conserve feed for scarce periods.



Figure 8: Pelletizer installation
(U.Rudiger 2023)

LCSR has provided a mobile pelletizer with a production capacity of 500 kg / h. The imported machine has a value of 9,000 TD (3,000 \$) and is operated with 380 V. Installation and training in use of the machine have been taking place in January 2023, but full functioning of the machine can only be expected when availability of olive cakes is ensured. Another source of by-products to become parts of the pellets could be dried tomato pulps.



Figure 9: First produced feed pellets
(U.Rudiger, 2023)



But even the collaboration with the two other above mentioned farmer organizations could help to have access to needed ingredients for the pellet production. By-products like date kernels or downgraded dates could be obtained from GDA El Marai in Douz or Luzerne as a protein source from either one of the FOs. To further develop this living lab and the collaboration between the three FOs, regional workshops and FO to FO visits should and will be organized by the initiative.

Annex: List of participants

#	Name of nominee	Gender	Location	Position/Organization
1	Chaki Jalloul	M	Tamazret, Tunisia	President of GDA Tamazret
2	Hasri Mahbli	M	Tamazret, Tunisia	Farmer, GDA Tamazret
3	Abdallah Abiri	M	Tamazret, Tunisia	Farmer, GDA Tamazret
4	Maamoun Mes	M	Tamazret, Tunisia	Farmer, GDA Tamazret
5	Houssein Grain	M	Tamazret, Tunisia	Farmer, GDA Tamazret
6	Lotfi Zaies	M	Tamazret, Tunisia	Farmer, GDA Tamazret
7	Touhaini Khorchani	M	Medenine, Tunisia	Researcher IRA Medenine
8	Kherdorani Rhida	M	Beni Khadeche, Tunisia	Farmer, GDA Beni Khadeche
9	Toumi Khlifi	M	Beni Khadeche, Tunisia	Farmer, GDA Beni Khadeche
10	Houcine Soudaoui	M	Beni Khadeche, Tunisia	Farmer, GDA Beni Khadeche
11	Mohamed Abid	M	Medenine, Tunisia	Researcher IRA Medenine
12	Maroua Dorai	F	Tunis, Tunisia	Researcher, INRAT
13	Mourad Abdoula	M	Tunis, Tunisia,	Agrolink enterprise
14	Udo Rudiger	M	Tunis, Tunisia	Researcher, ICARDA



The **CGIAR Research Initiative on Livestock and Climate** is designed to address the challenges that climate change poses to livestock production, providing livestock-keeping communities with the support they need without accelerating greenhouse gas emissions or degrading land, water, and biodiversity.

It forms part of CGIAR's new Research Portfolio, delivering science and innovation to transform food, land, and water systems in a climate crisis.

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