LIVESTOCK DEVELOPMENT, A PILLAR FOR IMPROVING LIVELIHOOD OF BEDOUIN COMMUNITIES IN THE HOT DRY AREA OF NORTH-WESTERN COASTAL ZONE, EGYPT

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SUMMARY

The target populations of the study were Bedouin communities in the hot dry area of North-western Coastal Zone (NWCZ), Egypt. Baseline survey was carried out on 200 householders from four locations, special questionnaire was also used over 70 women. Six livestock interventions were implemented on 339 householders and144 women for three years, each beneficiary participated on average in 3.2 interventions.

Selection of well-performed adapted local Barki sheep were implemented through ram competitions (100 rams annually). Rams were tested for their production performance (over 100 days), and tolerance to heat stress. Top rams got 50-80% higher price, and value of the flocks rises by 25%. Productivity of Barki local goats were rises by crossing with Damascus bucks (101 bucks); crossbreds were 50% heavier, and of double milk production. Householders used barley hygrograss in the summer, while women used it all the year around. Early fattened lambs were10 kg heavier and marketed two weeks earlier.

Modern dairy processing implemented successfully with 15 women groups (144 ladies), and their products were explored at different events. Vaccination against infectious diseases and treatment of internal and external parasites, reduced lambs and kids' losses by 10-20%. A breeder's association for Development Barki Sheep in Matrouh were established and operated as breeders 'network.

The overall socioeconomic assessment indicated that livestock development interventions increased income of the household by 20% and improve value of their flocks by nearly 25%. The beneficiaries' skills and knowledge had improved in the areas of the interventions.

Keywords: livestock development, hot dry, Egypt, livelihood, impact assessment, Bedouin community

INTRODUCTION

North-Western Coastal Zone (NWCZ) was one of the main food-baskets of the Roman Empire. The literature highlighted the skills of the local Bedouin communities for adaptation to hot dry conditions, especially in regard of water management, building more than three thousand Roman cisterns, in use up to now, sites of the cisterns were carefully chosen to collect run-off water (Shata, 1991). Bedouin pastoral community had settled in the NWC since 11th century, lands are communal, and families move seeking pasture. Raising sheep and goats, beside some camels, is the main socioeconomic activity for local communities. Land allocation had taken place since 1920, to avoid tribes' conflicts (Bonnet, et al., 2014*).* Additional socioeconomic stressors are rising the demands for employment, globalization of national economy, emergence tourism and outside immigration.

Since the sixties, national strategies aim at the settlement of the Bedouin communities, they cultivate barley with the introduction of tractors, tourism thrived in the eighties, and concrete houses were built in the nineties through long-term loans with free interest. The Bedouins started to cultivate barley, figs, and olive by receiving seeds, fertilizers, food aids, and tractors, in partnership with international organizations (WFP, WB, FAO, and UNDP) (Alary et al. 2014). Land holding rights were developed, and land tenure is associated with allocation rights at the level of tribe, family, and householders.

NWCZ is organized in stratification that follows rainfall gradient from North to South. The western part, from Marsa-Matrouh to Sidi-Barani is the main rainfed area, where agriculture activities exist for a depth of 0-15 km. Crops (mainly barley), horticulture (mainly figs and olive), and animal production (sheep, goats, and some camels) are the main agriculture activities, yields are generally low and highly variable (World Bank Egypt, 2003*).*

The area is hot dry, annual rainfall varied from 80 to 140 mm /annually along the coast, with average rainfall for Sidi-Barani (Barani), Negila and Marsa-Matrouh (Matrouh), and low rainfall in Ras-Hekma (Hekma) and Dabaa. Local Barki sheep and goats are raised under extensive system on natural range, plus rainfed barley, as livestock feed. They are hardy animals and have remarkable ability to live and reproduce under hot dry conditions, (Aboul- Naga et al.1976, Galal 2005, El- Beltagy et al., 2016, and Aboul -Naga et al., 2021). Barki sheep have small fat-tail, small body size, low lamb performance, but has its preference among consumers in Egypt and

Arab countries as good lean and marble carcass. Barki goats are mostly black, small in size and milk production is hardly enough for their kids, with some surplus for home consumption (Aboul -Naga et al., 1987).

The objective of current study is to reduce vulnerability, and improve resilience and livelihood of local Bedouin communities in the hot dry area of NWCZ, representing hot dry areas in WANA (West Asia and North Africa) region. These were practiced through the implementation of six livestock interventions: selection and promotion of well-performed adapted Barki rams, improving productivity of Barki goats by crossing with Damascus (D) bucks, improving the utilization of available feed resources, early fattening of lambs, animal health care and empowering of Bedouin women through modern dairy goat processing. The target groups were small and medium breeders in the four locations; Matrouh, Negila, Barani and Hekma as the main rain-fed area, where 75% of the sheep and goat populations are raised.

MATERIALS and METHODS

Base line survey (BLS):

BLS was carried out on 200 household in the four locations (Matrouh, Negila, Barani and Hekma) by 2017, sampled according to animal population in each location (Fig 1). The field survey includes information on family, land tenure, cropping, animal holdings, flock structure, productivity, feeding and farm inputs, marketing and farm outputs, and the interest of the householders to participate in the proposed interventions. Special questionnaire was designed and carried out on 70 Bedouin women by expert ladies. The questionnaire includes information on family structure, type and number household animals, women role in the family income, and their interest to participate in dairy processing intervention.

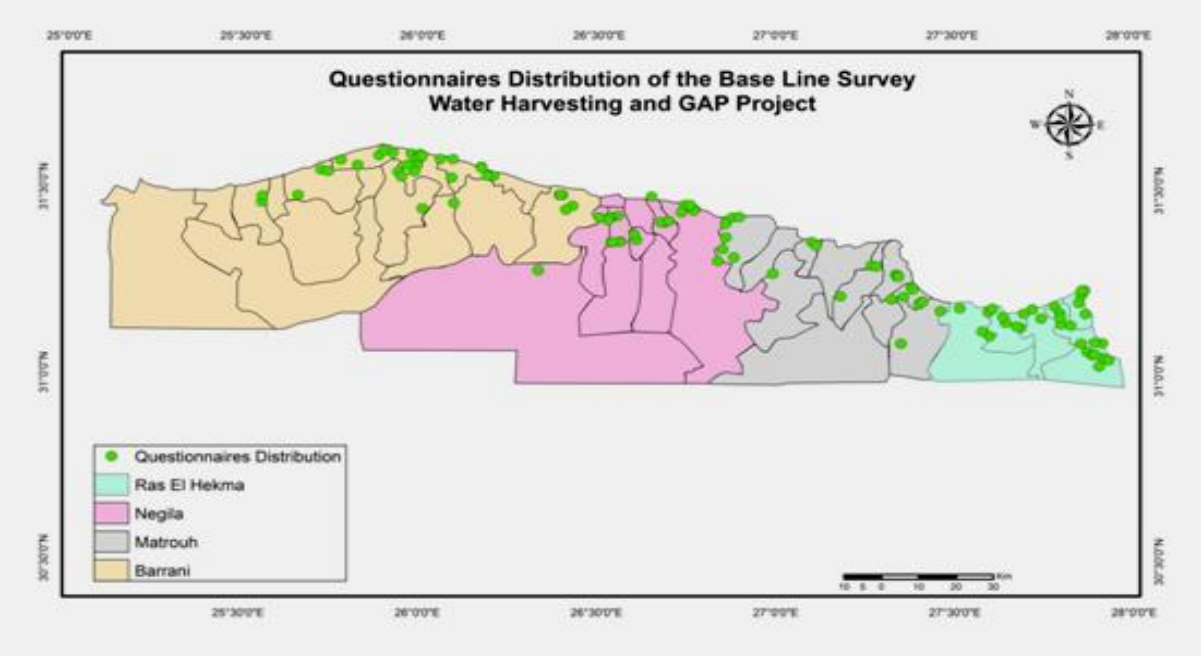

Fig. 1. Distribution of the BLS on the four districts.

Six livestock envelopment interventions were applied over three years (2017-2019) on the target populations as follow:

Intervention 1: Selection and promotion of well-performed adapted Barki rams.

The target number of selected farms were 100 rams annually over three years (2017-2019), collected from breeders' flocks upon their choice as breeding rams. Conditions for participation were; fulfilling phenotypic characteristic of Barki breed, 9-18 months old, good health, body weight ≥ 35 kg. Rams were raised for 100 days in Matrouh Farm, fed properly and tested for:

- Growth performance by weighing them weekly.
- Adaptation to physical heat stress (PHS) walking for 7 km under solar radiation from 12 to 3 pm (simulating summer grazing on poor pasture), and measure their physiological response:
- Body measurements and conditions,
- Testicular circumference and libido.

Ram Selection Index (RSI) was developed from 100 points, final weight (20 points), daily gain (20 points), body conditions and measurements (10 points), response of physiological parameters with PHS (30), and testicular circumference and libido (20 points). Rams from each age group were ranked and the top 10 -12% (RSI ≥ 85) received certificate of excellency and financial awards. The second group was certified as "Very Good" (RSI ≥75) and recommended for breeding in their flocks. Low performed rams were certified as" Average" and was not recommended for breeding. The performance of the winning rams in their flocks and their offspring

were followed by group of experts after one year of the ram's competition.

Within this intervention, network of interest breeders was initiated and operated as specialized agricultural association with legal entity "Association for Development Barki Sheep, ADBS", for promotion and development of Barki sheep in Matrouh.

Intervention 2: Distribution of Damascus bucks for crossing with Barki goats:

Based on the encouraging results of crossing Barki goats with Damascus (D) by APRI (Aboul-Naga, et al., 2008) ; 101 D bucks were distributed on 2017 and 2018 to goat breeders in the 4 locations ; those owned at least 30 mature goats .The breeders contribute 35% of the buck price. Follow up D bucks' performance was carried out by field visits to the breeders in 2018(for those distributed in 2017)and in 2019 (for those distributed in 2018) as; reproductive performance of D buck vs. Barki's; growth performance of crossbred kids, and milk production of crossbred does.

Intervention 3. Improving local feed resources:

Feed Additives, with the feed shortage in the summer, the breeders feed their animals on barley straw and crop residues as available. Feed additive from molasses, non-protein nitrogen, minerals, and vitamins (MoFeed) ,developed earlier by APRI, were used to enrich the nutritional value of the poor roughage for 100 breeders. MoFeed was available in bottles of 10 litters to treat 250 kg of straw.

***Barley hygrograss*:**

Forty-six barley hygrograss units were provided to the beneficiaries, in addition to twenty-four units provided to interest women, each unit produces daily green forage for 25 lambs/kids,

***Intervention 4: Early fattening of lambs*:**

Early fattening of lambs at 3- 4 months of age, utilizing double purpose feeders (concentrates and roughages) plus soyabean meal, were applied with twenty breeders. Initial weight, monthly and final weights were measured and recorded by the breeders themselves, in comparison to those fattened by the traditional way. With the increase demand from the breeders, the intervention was expanded to another 48 breeders in 2019, with their contribution to 35% of the costs.

Intervention 5: Dairy processing intervention:

The interest women were divided into15 groups (total 144 women); each group contained 8-15 women live near each other or belonging to the same family, with one leader of their choice. Each group was provided with full set of modern dairy processing facilities (centrifuge, butter shaker, cheese processing and dairy facilities). Training workshops were held yearly for each group, at the house of the leader, focusing on butter and cheese making with different flavors, and packing it for marketing. Their dairy products were exhibited at number of events.

Intervention 6: Animal health care

The study supported animal health care through annual vaccination campaign against contagious diseases (using Co-vaccine 10), and treatment for internal & external parasites. It was carried out on 332 small and medium flocks in the four locations, with training workshops on health care of the flocks for 164 breeders.

Number of householders benefited from different livestock interventions totaled 339 breeders in the four locations, according to number of interventions they participated in (Table 1).

Table 1. Number of breeders benefited from the study interventions/location

Number of interventions	Benefited householders				
	Matrouh	Negila	Hekma	Barani	Total
6	3	5	1	0	9
5	2	2	2	3	9
4	7	8	1	4	20
3	11	15	11	4	41
2	23	41	25	28	117
1	42	25	25	51	143
Total	88	96	65	90	339

Socioeconomic impact assessment:

Mixed approaches of beneficiary-oriented and participatory one were adopted in 2020 for socioeconomic impact assessment of the interventions on a random sample of 50 beneficiaries (15%) . Given that the beneficiaries were offered, in optional matter, more than one intervention, the beneficiaries were selected according to number of interventions they participated to. Sample of 21 women (30%) was selected for the dairy processing intervention. The socioeconomic impact assessment emphasis on social, economic and technical indicators, as well as the householders' views regard the outcomes of each intervention and their sustainability.

Data were analyzed according to its nature; regression and correlation analysis were used to measure functional relationships between different variables, while descriptive statistics were used to compare current and previous situation. Both quantitative and qualitative data were combined to explain the findings. The socioeconomic impact was defined as: relevance, effectiveness, sustainability, cross-cutting issues, and value added.

RESULTS and DISCUSSION

Base line survey:

The main findings of the BLS are presented in table (2), and can be summarized as follow:

-Families are extended of around 14.5 members, land tenure averaged 54.2 acres, of which 13.3-acre fruit trees (mainly olives and figs), the rest is rain-fed barley.

-Sheep flocks ,including weaned lambs ,averaged 254 heads, ranged from 162 in Barani to 332 in Hekma, goats herd average 38 heads, ranged from 35 in Barani to 46 in Hekma. The figures are generally high , BLS year is considered a good rainy year of 181 mm (Matrouh Metrological Station ,2018) the breeders tend to keep more animals in the flock.

-Sheep flocks consist of 83% ewes, 3.6% rams, 13.4% lambs; and goat herd consists of 78 % does, 4% bucks, and 18% kids.

-Indicators for the productivity of Barki sheep and goats are generally low, especially lambing rate , twinning rate and high kid losses (Table 3).

-Sheep and goats contribute more than 50% of the family income for 65% of the surveyed householders.

Considering the interest of the householders in the livestock interventions (Table 2), majority of the breeders were interest in Barki rams 'selection (83%); 75% in barley hygrograss ;73% in Damascus bucks; and 67% in feed treatment. Only 15 % of the householders were interest in modern dairy processing by their women There were significant differences between the four locations in their choices, however all of them highlight the need of health care for the flocks.

The findings of the BLS for women, indicated that most of the women are illiterate (Table 4), have in average 4.5 kids, they are involved in house animal rearing (5-20 heads of sheep and goats and 20-50 rural poultry), and dairy processing (butter and fermented milk). Most of them were interested in the know-how of better dairy processing and improving house animal rearing.

Table 2. Main findings of the base line survey

Indicators	Negila	Matrouh	Hekma	Barani	Average
Number of breeders	72	38	31	59	200
Family size	16.2	14.7	14.5	12.2	14.5
Land tenure (acre)	60.6	53.5	72.9	33.3	54.2
Barley (acre)	45.7	39.3	46.8	23.4	38.4
Figs& olives (acre)	11.7	11.9	21.6	9.7	13.3
Sheep flock size (head)	297	245	332	162	254
Goat herd size(head)	39.5	32.6	46.3	35.0	37.9
Interest to participate in the interventions (%)					
Barki rams selection	40	23	36	66	82.5
Damascus Buck	33	26	31	56	73
Feed Treatment	27	22	30	55	67
Early fattening	18	4	3	10	35
Barley Hygrograss	42	24	28	55	75
Dairy Processing	15	11	14	21	15

Table 3. Productivity for Barki sheep and goats (%)

Performance %	Negila	Matrouh	Hekma	Barani	Average
Sheep:					
Fertility (ewes lambed /total ewes)	79.7	89	81.9	86.2	83.1
Lambing rate (lambs born /ewes lambed)	112	99	107	104	107
Weaned lambs	90.4	87.4	87.1	89.1	87.2
Lambs Died	7.9	10.7	8.3	11.2	9.1
Goats:					
Fertility (does kidded /total does)	87.1	82.3	82.1	87.1	85.3
Kidding rate(kids born/does kidded)	167	163	183	157	166
Weaned kids	82.6	84.1	72.8	86.5	81.9
Dead kids	16.7	15.9	18.7	14.5	16.4

Table 4. Household women survey

Location	# Women	Education			No. kids	Dairy products		
		Illiterate	R&R	Primary		Butter	Ferment	Others
Matrouh	19	18	-	1	5	15	1	1
Negila	28	20	8	-	5.3	17	17	7
Barani	17	13	4	-	4.2	8	4	5
Hekma	6	4	1	1	3.5	4	3	5
Total	70	55	13	2	4.5	44	25	18

Livestock development interventions:

Number of householders participated in different livestock development interventions per location are presented in table (5).

Intervention 1. Selection of well-performed adapted Barki rams:

Cycles of Barki rams testing, and selection were held for100 rams from breeders' flocks annually, they were raised for 100 days at Matrouh Farm and tested for their productive performance, and tolerance to heat stress. Total number of rams participated over the three years were 298 rams. The top 10-12 % rams were certified and awarded as "Distinguished rams" and returned back to their owners to use in their flocks and lent to neighbors and relatives. The 2nd group of rams (20-30 %) were certified "Very Good" and recommended for breeding in their own flocks.

Performance of the winning rams at their flocks over a year, can be summarized as follow (Table6):

- Winning rams get 50 -80% higher marketing prices than other rams in the flock,
- Price of their flocks rises by 20-25%,
- Fertility of the winning rams was better than other rams in the flock.
- Thirty-50 % of the breeders lent their winning rams to other breeders (neighbors and relatives)

For further physiological and genetic investigations of heat tolerance of the winning rams and their offspring, 10 winning rams (six in 2018 and four in 2019) were transferred and bred at Borg- Arab Farm. Fig. (2) present the physiological response of the winning rams to PHS vs. the farm-rams (Temperature Humidity Index was >85). It showed clearly better heat tolerance to hot dry conditions in poor pasture than the farm- rams presented in differences in rectal temperature (RTD) respiration rate (RRD) and gas volume (GVD).

Table 5. Number of breeders 'participations in each development intervention / location

Project Activity	Number of participants in each intervention				
	Barani	Hekma	Negila	Matrouh	Total
Barki ram selection	49	66	113	70	298
Damascus Bucks	25	27	30	19	101
Barley Hygrograss	20	11	23	16	70
Feed Treatment	26	16	46	28	116
Early fattening	13	7	17	31	68
Dairy processing (women)	(18)	(32)	(70)	(24)	(144)
Health Care	87	75	92	78	332

Table 6. Follow up performance of winning rams

Region	Rams in the flock	Ewes in the flock	Increase in price (%)	Lambs born/yr	years of ram service	Lending (%)
Negila	22	280	50	40	6.7	36
Barani	6	261	50	30	6.6	17
Hekma	4	143	75	31	8	50
Matrouh	6	158	60	44	7.1	17
Total/aver.	38	211	56	36	6-8	30

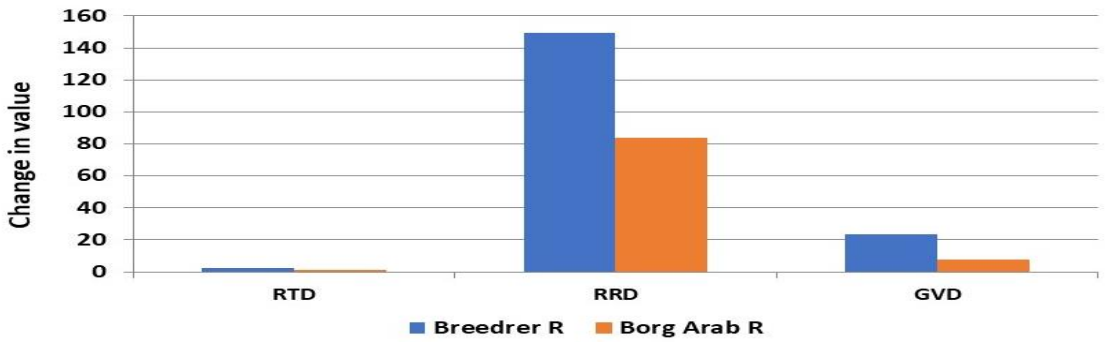

Fig. (2). Physiological Response of winning ram to heat tress vs. farm-rams.

Establishing beneficiary network, was the proper strategy for the sustainability of the proposed developmental activities, and good governance. Understanding values, traditions, and governing rules of the local communities, like those related to gender and ethnic, is crucial for the success of any interventions in such remote areas. One of the main outcomes of the applied interventions is changing the mentality set of the local communities toward certain fixed traditions in the society, e.g., criteria for selection of their rams for breeding, utilization of local feed resources, health care of the flock and role of women in the family

Intervention 2-Crossing with Damascus bucks (D):
Follow the performance of the D bucks with the breeders, and their crossbred offspring were very encouraging, as follow (Table 7) ;

- Growth performance of D crossbreds was ≥ 50% better than Barki goats,
- Marketing weight and price of the kids were detectably higher (around 50%)
- The libido is better than Barki,
- Grazing ability of the D is equal to that of the Barki
- Milk production of D cross does double that of the Barki.

Table 7. Performance of D bucks vs. Barki, and their crossbreds

%Higher Milk	%Better grazing	%Better Libido	%Better Growth	Average Does no.	# D bucks	Locations
100	95	86	100	35.2	21	Negila
100	100	86	93	45.4	14	Matrouh
100	100	100	100	52.0	22	Hekma
100	100	91	95	51.6	21	niBara
100	99	91	97	46.1	78	Total/Av.

Intervention 3. Improving local feed resources:

Treatment of crop residuals, MoFeed as a feed additive was used to enrich the nutritive value of barely straw and crop residues by 100 breeders. Feed additive was available in 10 litters bottles to treat 250 kg of straw. Feed intake of the poor roughages increased by 20-25%

Barley hygrograss; 75% of the householders use barley hygrograss units only in summer, when there is no pasture, where 25% use it throughout the year. The issue raised by the breeders is that it needs daily work for cultivation and irrigation. Twenty-seven hygrograss units were provided to women interest in this intervention. They utilize the units throughout the year to feed their household animals, especially lambs/kids and milking goats. All women in the family contribute to the activity and their response were encouraging.

Intervention 4. Early fattening of lambs:

Results of following up the performance of early fattening lambs with the breeders are presented in Table (8).

- Daily gain of the early fattening lambs, were 30% more than the traditional ones,
- Fattening period was shorter by two weeks,
- Marketing weight was higher by around 10 kg,
- Feed waste was less by 30%,

Table 8. Results of early fattening of lambs

Location	No. of breeders	Fattened lambs	Initial weight(kg)	Fattening period (month)	Daily gain(gr)
Barani	13	820	12-35	2-4	322
Negila	17	1585	18-25	3	340
Matrouh	31	1852	15-30	2-3.5	304
Hekma	7	710	15-30	3	320
Total	68	4967	12-35	2-4	322

Intervention 5. Dairy processing for women,

Empowerment of Bedouin women and their role in the family income is an important objective of the study, in relation to raising household animals and dairy processing. Bedouin women were interested to get the know-how of modern dairy processing, and the opportunity of marketing their products. Training workshops were held for each women group, usually at the house of the leader. The training focused on cheese making with different techniques (vinegar, yogurt, or rennin), butter and yogurt; and packing the products in an appealing form for marketing. Dairy products of the ladies had been exhibited and marketed at number of events, with overwhelming response from the visitors.

Intervention 6. Animal health care,

Vaccination against contagious diseases (Covacin10) and treatment of internal and external parasites, were practiced on small and medium flocks through annual campaign, in collaboration with the Veterinarian Authority. Number of breeders involved in health care intervention were 332, and animals covered sum up to around 53,000 heads (Table 9). Animal health care sessions were held for 164 breeders. Seventy- three percent of the breeders

stated that the animal health intervention improved the performance of the flocks and significantly reducing losses in lambs and kids (10-20%)

Table 9. Number of animals benefited from animal health care

Location	2017	2018	2019	Total
Marsa Matrouh	3022	750	8112	11,884
Hekma-Ras	4965	3815	4045	12,825
Negila	5170	2458	6364	13,992
Barani-Sidi	4328	2787	6780	13,895
Total	17,485	9,810	25,301	52,596

Socioeconomic impact of livestock development interventions:

The studied livestock interventions involved 339 householders; representing around 5000 family members, benefitted directly from these interventions, beside the indirect impact of larger numbers from neighbors and relatives. The socioeconomic impact of each intervention was estimated.

***Selection of well performed heat tolerant Barki rams*:**

This intervention promotes the breeding of adapted Barki sheep to hot dry conditions. Assuming each ram mated to 100-150 ewes over 2-3 years, number of animals benefited from Barki rams' competitions were around 58,000 heads (Table 10). The real number may be doubled, as the rams served in the flock for 6-8 years. This in addition to those produced by the second grade of rams "Very Good"(58 rams). The direct benefits of the intervention, beside genetic improvement, are rising the price of the winning rams by 50-80%, and that of their flocks by 20-25%. Based on average flock size of 200 heads, increase in the flock value is estimated as 150 thousand EGP /beneficiary. Furthermore, 60 % of the winning rams were lent to other breeders, producing 27,000 offspring of 25% higher price. We need to emphasize that the estimates do not include the full impact of the interventions as the genetic improvement take longer period to reach its impact.

***Distributed of Damascus bucks*:**

Each buck(101) produced 150-200 crossbred kids over 2- 3years, which sum up to around 20,000 crossbred kids, 50% heavier in weight and of higher price and double milk production. All crossbred females were kept in the herd to replace Barki does. About 80% of the crossbred males were fattened and sold for 50% higher price, where 20% were raised as replacements or sold for breeding. Weight of the weaned crossbred kids was around 20 vs. 15 Kg for local Barki, consequently value of crossbred's kids exceeds those of Barki by nearly 32,000 EGP annually. The direct impact of crossing with D on the breeder's income estimated as 31,800 EGP +1700 EGP more milk /household. These are in addition to the indirect impact of lending 88 % of the bucks to other breeders.

The positive aspects of *barley hygrograss* were identified by the beneficiary as low-cost green fodder without land, using small amount of water, with the possibility of expanding it vertical and horizontally. *Early fattening* of Barki lambs enabling them to achieve the market weight in 60 days instead of 75 days, and cost of fattening decreased from 750 EGP / head to nearly 515 EGP/ head. The breeders were able to operate more than one fattening cycle per year. Direct impact of early fattening is estimated as 8600 EGP/cycle. Providing *veterinary care* is a crosscutting intervention, over and above the direct benefit of the intervention. Each livestock development programs have to include component for animal health care.

One hundred thirty-six women participated in *the dairy processing intervention*. It saves the family expenditure on buying dairy products by around 300 EGP /weekly. The direct benefit of the families from dairy processing is estimated to reach 15,000 EGP/year. The intervention changes the mentality of the women for house dairy processing as a sustainable enterprise for house income and varied dairy products for family nutrition.

The majority of beneficiaries (74 %) got increase in their income over the national poverty line of the governorate, estimated 119 EGP/ household for 2019/2020 (according to CAMPS,2021) .At the same time all interventions have resulted in increase in the beneficiaries income over the average household income (59,000 EGP as of 2019/20), except for Dairy processing ,where most of it used directly for home consumption.

The beneficiaries stated that their skills and knowledge had improved in the areas of the intervention; livestock breeding, improving local feed resources, early fattening, health care of their flocks, and dairy processing by women. These will have sustained positive impact on their livelihood from the livestock activity.

Table (10) Outputs of different livestock developmental interventions

1- Barki Rams Selection	
Number of winning rams	30
winning rams %	10%
Average increase in the price of the winning ram	100%
Average number of ewes inseminated by the ram	50/year
Average number of lambs born from the winning ram	125
Number of serving years of the ram	4 years
Breeders lend their winning rams to other breeders	60%
Average number of inseminated ewes in other flocks	100
Average increase in the flock price after ram wined	27%
2- Improved Goats with Crossing	
Average number of does inseminate by the D buck	60
Average period of keeping the D buck in the herd	3 years
Breeders lend their improved buck to other breeders	88%
Average number of crossbred kids produced over 2 years	86
Average weight of the crossbred kids at weaning (3 months)	30 Kg(vr.15kg)
Advantages; high sexual libido, crossbreds are heavier and higher in price and milk production	
3-Hydrograss Barley	
Responsibility of rearing the unit (Wife and girls) %	92
Planning to buy additional units	75%
Intention to continue activity after the end of the program n	91%
Advantages; low-cost green fodder without land; possibility of expanding increase goat 'milk	
4-Early Fattening Activity	
Length of fattening cycle	60 days (vr.90 days)
Reduction in feed consumption	30%
Breeders bought additional feeding units	56%
Average cost of early fattening/head	LE515 (vs.750LE)
Weight of lamb at the end of fattening	60 Kg
Advantages: Reducing fed losses; reaching market weight at shorter time and less costs	
5-Verinary Care	
Fulfilling animal's vaccination and treatment	100%
Training workshops changed concept related to veterinary care	100%
Get advantage of the veterinarian visits	100%
Reducing losses in the flock, especially lambs and kids	15%
Advantages: vaccination in proper time; veterinary visits and health care	
6-Dairy Processing	
Number of women interviewed	50
Quantity of milk allocated weekly for processing/ family	30 Kg
Weekly production of dairy products	5.8 kg
Home production as percentage of family consumption	65%
Family weekly expenditure on dairy products	L.E 300/ weekly
Advantages: Provide safe food ; new products ; potentiality of marketing empowering women	

Table 11. Beneficiaries opinion regarding sustainability of livestock interventions

Intervention	**Sustainability**
Barki rams selection	72%
Damascus bucks	54%
Improving local feed resources	52%
Hygrograss barley	57%
Early fattening	67%
Periodical vaccination of the flocks	34%
Dairy processing	100%

CONCLUSION

The studied interventions were designed per-se to mitigate effect of climate changes in the hot dry areas, by focusing on selection of adapted local sheep and goats, and combating the degradation of local feed resources, aiming for improving the livelihood of local community in the hot dry areas of West Asia and North Africa (WANA) region.

The overall outputs of the study indicated that the proposed livestock development interventions increased the income of the beneficiaries by about 20% and improve the value of their flocks by nearly 25%. The majority of beneficiaries (74 %) have an increase in their income over the poverty line of the governorate. These estimates do not reflect the full impact of the interventions, as the genetic improvement take longer period to reach their full impact, these are in addition to the indirect effects on neighbors and relatives.

Families' development activities should be complementary, so the multiplicity of the activities is enough to raise living standard of the family. The socioeconomic impact assessment of the interventions proved that livestock development-based program is crucial instrument for improving the livelihood of rural communities in the hot dry areas, and to get the poor ones out of their poverty economic status.

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تنمية الثروة الحيوانية ركيزة أساسيه لتحسين معيشة المجتمعات المحلية في المناطق الحارة الجافة

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إستهدفت الدراسه المجتمعات المحلية في المنطقه الساحلية الحارة الجافة بالصحراء الغربية ،جمهورية مصر العربية .تم إجراء مسح أولي على ٢٠٠ أسرة في أربع مواقع (رأس الحكمه ،مرسي مطروح ،النجيله ،سيدي براني) مع إستبيان خاص لـ 70إمرأة .تم تنفيذ ستة مداخلات في مجال تنميه الثروة الحيوانية على ٣٣٩ رب أسرة و ١٤٤ إمرأة لمدة ثلاث سنوات ، شارك كل منهم في المتوسط في ٣,٢ من المداخلات علي النحو التالي:

١- إنتخاب الأغنام البرقي المحلية جيدة الأداء من خلال مسابقات للكباش (١٠٠كبش سنويًا) .وتختبر الكباش لأدائها الإنتاجي وتحملها للإجهاد الحراري علي مدي ١٠٠ يوم .ارتفعت أسعار الكباش الأعلى في التقييم بنسبة ٥٠-٨٠٪ ، وارتفعت قيمة قطعانها بنسبة ٢٥٪ .تم إنشاء جمعية للمربين لتنمية الأغنام البرقي بمحافظة مطروح وتم تشغيلها كشبكة للمربيين.

٢- خلط الماعز البرقي المحلي بالتيوس الدمشقي (١٠١تيس) .وكانت الماعز الهجين أثقل بنسبة ٥٠٪ ، و ضعف انتاج اللبن .

٣- وحدات الشعيرالمستنبت إستخدمت بشكل أساسي في فصل الصيف ، بينما إستخدمته النساء طوال العام.

٤- التسمين المبكر للحملان زادت بمقدار ١٠ كجم عند التسويق علي مدي أسبوعين أقل من نظام التسمين التقليدي للحملان.

٥- تصنيع الألبان الحديثة مع ١٥ مجموعة نسائية (١٤٤ سيدة).

٦- التطعيم ضد الأمراض المعدية وعلاج الطفيليات الداخلية والخارجية أدي الي تقليل فقد الحملان والجداء بنسبة ١٠-٢٠٪.

أشار التقييم الإجتماعي الاقتصادي العام إلى أن مداخلات تنمية الثروة الحيوانية زادت من دخل الأسرة بنسبة ٢٠٪ ، ورفعت قيمة قطعانها بنحو ٢٥٪ .وتحسنت مهارات ومعارف المستفيدين في مجالات المداخلات.