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Situation of Women Farmers Using Draught Animal Technology (DAT) in Elfashir, North Darfur State

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Abstract – **The situation of women farmers using DAT in north Darfur state was explored through a cross-sectional survey on a sample of 30 farmers selected following the systematic random sampling technique. Field data was collected using a formal survey questionnaire in face to face interviews and direct field measurements. The results showed that most of the women farmers are less experienced in DAT and their special needs were not considered or addressed upon inclusion in DAT project. They received improper training and extension and this reflected on less than optimal husbandry and management practices which led to moderately low to low field capacity (ha/h).**

Keywords – **Women Farmers, Draught Donkeys, Harness, Field Capacity and Efficiency, DAT in Darfur.**

I. Introduction

The potential positive role of DAT in Sub-Saharan Africa is well understood and documented [1, 2, 3]. In the traditional rainfed farming system in Sudan where food security of farming households is the major concern DAT became increasingly popular and many projects were designed for technology introduction and promotion [4]. Nevertheless, adoption rate is low and field performance of the technology still lags behind being optimal in many sites [5, 6]. The major indicator for capacity evaluation in this technology is husbandry and management practices of draught animals along with field performance [7]. Darfur is a typical example for traditional farming in western Sudan where women constitute the major manual labour input in agriculture. [8] presented the positive role DAT plays in farming in the region. Despite this women were not considered as a separate component in DAT projects and were included on equal grounds as men. [9] emphasized that "Animal traction technology introduced to women is often inappropriate because women have not been consulted during design and planning" and stressed that "For women to benefit and participate fully in an animal traction project, constraining factors have to be recognised explicitly and a gender-sensitive planning approach has to be adopted. Project planning should incorporate a detailed gender analysis and gender awareness needs to be emphasised in all levels and activities of a project or programme. Involvement of women as a group independent from men can be an effective method of ensuring women's full participation". They suggested improved technology and better management as mechanisms to reach increased production [9].

In Darfur, giving equal access to women farmers was not as easy as anticipated as many female headed households are among the least affluent in the community. In addition, many women expressed doubts in their ability to manage ploughs. The use of the plough has reduced time in many farming operations in which women played major roles [10].

In order to insure better inclusion of women in DAT in Darfur a gender based plan has to be tailored and implemented. Obviously this starts by exploring women's capacity and level of technology application. However, data on women situation in DAT is scanty or absent; at least in the published form. Therefore, this study aimed at assessing the situation of women farmers using DAT in north Darfur state through assessment of their animal management/husbandry practices and field performance.

II. Materials and Methods

Study Area

El-Fashir, the capital of north Darfur State is located in the semi-arid savanna zone in Sudan. The traditional rainfed farming system dominates the area. Farming units are small to medium in scale. Most of the population depends on traditional agriculture growing cereals for subsistence with marginal surplus sold in the market. The land is flat to undulating and the soil is sandy to sandy loam. Farming relies on manual labour in which women represent the highest input (up to 80%) with considerable portions using draught animal technology where donkeys, horses and camels are used for agricultural work and transportation.

Sampling

This study was based on the cross-sectional survey design. A sample of 30 farmers was selected from Elfashir locality following the systematic random sampling technique based on geographical location. The first of every four women farmers was chosen along a survey line drawn across the farming area starting at the upper end until 30 farmers had been selected.

Data Collection and Analysis

The main husbandry and management parameters considered in this study were:

- Animal health (veterinary care, vaccination and wounds management).
- Animal feeding and watering practices.
- Animal harnessing (type, care for harness and wounds related to harnessing).

- Plough condition (care measures, knowledge of maintenance and implement condition).
- Field performance (field capacity and efficiency).

All of these practices were evaluated against the standard ones presented by [11].

Data were collected using a formal survey questionnaire in a face to face interview for literacy reasons and by direct field measurements during land preparation. Some information was recorded as observations to avoid farmers' bias on issues they can consider "sensitive".

Further, field capacity and efficiency were determined as direct assessments of the field performance in accordance with [12, 13]. Two stop watches and a tape measure were used to record the total and net times of operation and the land dimensions, respectively.

Then the effective field capacity (ha/h) was taken as the product of dividing the area worked (ha) by the total time (h) as follows:

Effective field capacity (F.C-ha/h) = Area (ha)/Total time (h).

And the field efficiency = Net productive time/Total time of operation.

Animal body condition was determined following the body condition scoring system [11].

Survey data were entered as individual readings into an SPSS computer programme (SPSS 16.0). Data were analysed to produce frequency and percentage tables.

III. Results and Discussion

General Background of Women Farmers

The highest percentage (46.6%) of women farmers using DAT were less than 30 years old. These were followed by 36.8% between 31 and 40 years. Marginal portions were in older age. According to [14] farmers in this age are *"expected to be very active, adventurous, and desirous of innovations that are capable of improving their life and farm work"*. The majority (60%) of women farmers had low or no education (33.3% had informal education and 26.7% attended primary school); while two fifths of them (40%) went to high school. Education is one of the determinant factors affecting the success in DAT adoption, while lack of extension amongst other factors affecting draught animal technology (DAT) was mentioned by [15]. The authors further presented that the constraints reported by farmers were lack of funds, extension packages are designed to suit farmers' capacity and education. The low- or no-education implies careful extension intervention especially for women. According to [10] the area lacks proper extension service in DAT not to mention those relating to women or gender issues. Further, [3] suggested that extension programmes should give special emphasis to women farmers.

Donkeys were the major draught animals used by women farmers (90%), while trivial portions of them used horses and camels. This common in the study area [8] and is slightly different than the neighbouring north Kordofan state where horses are the major draught animals [5].

Draught animals body conditions showed alarming results as one half (50%) of the donkeys were less than moderate, while one third of them were moderate. A marginal portion (10%) was more than moderate. This suggests poor feeding and management practices are poorly practiced which indicates low capacity and know-how of these farmers on animal management. [2] made a close presentation in the neighbouring north Kordofan state.

Women Farmers' Background on DAT

Most of the women farmers (70%) had low experience in DAT (Table 2). Considerable portions of them had 7-10 years and more than 10 years of experience (13.3% and 16.5%, respectively). Years of experience along with training reflect on farmers' capacity in managing the technology for a successful employment of DAT. In this regard it is obvious that the low experience can potentially reflect on less than optimal application of the technology especially if farmers do not get the proper training. [14] reported that farmer's age, family size and farming experience of farmers were significantly related to their attitudes towards the use of animal traction technology.

Lack of extension amongst other factors affecting draught animal technology (DAT) was mentioned by [15]. The authors further presented that the constraints reported by farmers were lack of funds, inadequate formal education, limited feed resources, few implements are used, disease treatment, lack of shelter for the animals and poor extension services.

Unlike sub-Saharan Africa where farmers mostly learn about the technology from their peers or family members [10], most (73.3%) of the women farmers in north Darfur learnt about DAT from formal institutions (53.3% from NGOs and 20% from the Ministry of Agriculture). Those who learnt about DAT from their peers or family members were slightly more than one fourth of the total sample (26.7%). Source of knowledge on the technology is a very important indicator for famers' knowledge and application of it. [17] Further, the author mentioned low capacity and inadequate funding, poor infrastructure, undefined curricula and poor strategies as some limiting factors to farmers training and adoption of animal traction.

Interestingly most of the women farmers (83.3%) claimed receiving training on DAT but this can be misleading if training quality, aspects and duration are not taken into account. All these should reflect on proper and optimal field performance. [17] presented training as one of the major constraints to the technology.

Advantages of DAT as seen by farmers showed varying concerns. They ranked as follows:

- Increase in productivity (70%).
- Ease of technology use (30%).
- Labour saving (26.7%).
- Drudgery reduction (20%).

All these comply with the presentation made by [18]. All these potential benefits can be realized only if farmers are well trained on the technology application and are supported by the suitable extension packages to help them achieving their full capacity and consequently food security. The fact that all the farmers ignored the potential benefit of increased yield shows lack of information and proper tools or both.

Interestingly ranking of DAT advantages did not comply with farmers' motives for adopting the technology and the majority (63.3%) of the farmers mentioned ease of use as their main motive. Suitability to the farming system and cultural acceptability ranked second and motivated 23.3% of the farmers to adopt the technology. It is evident from this situation that farmers somehow lack proper knowledge on the potential benefits of this technology to the extent that they failed in being consistent in their opinions on the technology advantages and their motives of adopting it. This is a matter of capacity and extension assistance in getting the right information on that technology. This goes in accordance with [19] who argued that small scale farmers are not receiving the information that they need, much of which is available to improve their farming practice.

Access to veterinary service is the main constraint mentioned by the majority (53.3%) of women farmers. [1] reported a similar trend in north Kordofan. Requirement of physical effort ranked second and was mentioned by 36.7% of the women farmers. This is an interesting response as in all situations the technology causes less drudgery than the manual alternatives. Then it is women's ambition of an easy technology that stands behind such a response. Lack of feed and services received less attention and were mentioned by trivial portions of the women farmers. These constraints comply somehow with the ones presented by [18].

Women farmers' opinion on veterinary service and its role in DAT are presented in Table 3.Further, the majority (70%) of women farmers vaccinated their animal. The majority of them (60%) mentioned veterinary service as the suitable measure to follow when the animal gets sick; most (96.7%) of them think that veterinary care is the suitable measure to keep the animal in a good shape and 80% of them think that veterinary care improves animal condition or its' working capacity. Nevertheless, most of them (86.7%) resort to cleaning and local remedies to treat animals' wounds. To most of the farmers veterinary is inaccessible geographically or financially and this reflects negatively on their benefit from it; even if they acknowledge and respect its potential positive role in DAT. Comparable results were reported by [2] in the same farming system.

According to farmers measures to be followed to keep animals in a good body condition revolve around feeding (Table 4). The highest percentage (46.6%) of them focused on offering enough feed, while equal portions (26.7% each) focused on adding supplements or offering concentrated feed to the animals. Extension and education played no role here [2].

Dry forage is the main (63.3%) type of feed offered during the year; followed by dry forage and concentrates (26.7%); while green forage ranked last (10%). In the traditional rainfed farming system possibility of green forage production is very limited. Further, open grazing is not an option to farmers due to the instability in the state and to avoid animals theft. [5] presented comparable results in the same farming system. Other animal feeding related parameters showed the following trends:

- Self collection of animal feed (90%).
- Animals are fed differently (80%); at the beginning of the season (56.7%).
- Animals are mostly fed in the afternoon (50%) or morning (40%).
- Water is offered to the animals before feeding by the majority of farmers (56.7%) and during work by 53.3% of them.

Animal feeding practices show serious issues of lack of information and/or misapplication of the guidelines of proper feeding. The situation is not different from that in neighbouring states [2, 20] where feeding showed many discrepancies relating to lack of extension and training.

Collar and saddle bought from the market is the popular (76.6%) harness although it is not commonly used with donkeys; followed by straps and ropes (13.3%). Straps are more common with donkeys in Darfur states. A comparable trend was witnessed with horses [2].

Farmers' information on harnessing appears to be disputable (Table 5). While inspection of harness, animal body and rear hinds showed positive response and good practice by the majority of farmers; this did not reflect on a good practice in harness storage and the majority of respondents toss the harness on the ground at home (73.4%) or on the field (20%). Harness stitching is another aspect of lack of information as 50% of the harnesses were stitched to the inside which can potentially endanger animal health and cause bruises, cuts or wounds. This is evident as 40% of the donkeys exhibited signs of loss of hair due to harness rubbing of their skin. Comparable results were reported in other sites [5].

Plough care measures were not different than harnessing and exhibited disputable trends too (Table 6). Farmers' knowledge on plough inspection before and after work showed good practices by the majority of farmers (53.3% and 56.7%, respectively). This did not extend to include plough care measures at the end of the season and only 26.7% of the farmers mentioned the proper practice. Further, despite the relatively 'good' daily plough inspection by the majority of farmers, plough storage at the end of the working day was seriously improper as most of the farmers (73.3%) leave it tossed on the ground on the field or at home. This resulted in rusty plough for half of the cases. In addition to this, one half of the farmers did not properly store their ploughs at the end of the season.

This presentation raises question on the quality and aspects of training received by the farmers (63.3% claimed being trained on plough maintenance and 60% claimed knowledge of the routine maintenance at the end of the working day). Source of knowledge for the latter was mostly (89.9%) peer farmers. Lack of information on plough care appears to be characteristic in the traditional rainfed farming system [2, 5, 20].

The less optimal management practices, veterinary care, harnessing, farmers' capacity and knowledge and animal body condition reflected on poor field performance of women farmers and the majority of them worked at comparatively lower field capacity (43.2% worked at 0.09 ha/h and less, while 26.6% worked at 0.1-0.13 ha/h). Considerable portions worked at comparatively medium to

high work rates. Comparable ranges were reported for the neighbouring states [2, 3, 20, 21].

IV. Conclusion

Husbandry and management practices of women farmers using DAT in north Darfur are less than optimal. This reflected directly on field performance and most of the farmers worked at moderately low to low field capacities. When women are included in DAT on the same grounds as men, they are unlikely to benefit from any training or extension packages.

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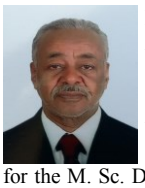

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Table 1 General Background of Women Farmers (n=30)

	Frequency	Percent
	Age	
<30 years	14	46.6
31 - 40 years	11	36.8
41 - 50 years	3	10.0
>50 years	2	6.6
	Education	
Informal education	10	33.3
primary	8	26.7
High school	12	40.0
	Animal Type	
Donkey	27	90
Horse	1	3.3
camel	2	6.7
	Animal Body Condition	
thin	2	6.7
less than moderate	15	50.0
moderate	10	33.3
more than moderate	3	10

Table 2 Women Farmers Background on DAT (n=30)

	Frequency	Percent
	Years of Experience in DAT	
1 - 2 years	12	40
3 - 5 years	9	30
7 - 10 years	4	13.3
> 10 years	5	16.5
	Means of Learning about the Technology	
Peer farmers	8	26.7
NGOs/Practical Action	16	53.3
Agricultural Extension	6	20
	Receiving Training on DAT	
yes	25	83.3
no	5	16.7
	Opinion on Increase in Productivity as one of DAT Advantages	
yes	18	60
no	12	40
	Opinion on Ease of Use technology as one of DAT Advantages	
yes	9	30
no	21	70
	Opinion on Labour Saving as one of DAT Advantages	
yes	8	26.7
no	22	73.3
	Opinion on Drudgery	
	Reduction as one of DAT Advantages	
yes	6	20
no	24	80
	Main Reasons behind using DAT	
it suits our knowledge and capacity	7	23.3
comfortable and easy to use	19	63.3
improved timeliness and productivity	3	10
availability of farming services	1	3.3
	Main Constraints of DAT	
it requires physical effort	11	36.7
Inaccessibility of veterinary service	16	53.3
lack of services	2	6.7
lack of feed for the animals	1	3.3

Table 3 Veterinary Care of Draught Animals (n=30)

	Frequency	Percent
	Animal Vaccination	
yes	21	70
no	9	30
	Opinion on the Measures to be Followed when the Animal is Sick	
nothing	1	3.3
veterinary care	18	60
buying medicines from the pharmacy	2	6.7
local remedies	9	30
	Opinion on the Suitable Measures to keep the Animal in a good Health	
veterinary care	29	96.7
vaccination	1	3.3
	Opinion on the Potential Changes Brought about by Veterinary Care	
improving animal's condition.	13	43.3
improving animal's appetite	2	6.7
improving animal's work capacity	11	36.7
nothing	4	13.3
	Wounds Management	
	Frequency	Percent
local remedies and cleaning	26	86.7
veterinary care	4	13.3

Table 4 Animal Feeding Practices

	Frequency	Percent
	Measures followed to Insure animal condition (n=30)	
offering enough feed	14	46.6
adding supplements to the	8	26.7

feed		
offering concentrates besides forages	8	26.7
	Type of Main Forage Offered During the Year (n=30)	
green forage	3	10
Dry forage and concentrates	8	26.7
dry forage	19	63.3
	Feed Source (n=30)	
market	9	30
collect it myself	21	70
	Difference in amounts of Feed offered During Work (n=30)	
yes	24	80
no	6	20
	Times in which Feeding Differ (n=24)	
at the beginning of the season	17	70.8
before the beginning of the season	7	29.2
	Time of Animals Feeding (n=30)	
in the morning	12	40
in the afternoon	15	50
during work	1	3.3
in the morning and afternoon	2	6.7
	Animals Watering (n=30)	
before feeding	17	56.7
after feeding	13	43.3
	Animals Watering During Work (n=30)	
yes	16	53.3
no	14	46.7

Table 5 Animal Harnessing (n=30)

	Frequency	Percent
	Harness Type	
collar and ropes	3	10
collar and saddle	23	76.7
strab and ropes	4	13.3
	harness Source	
market	23	76.7
make it myself	7	23.3
	frequency of Harness inspection	
1 - 2 days	18	60
3 -5 days	4	13.3
6 - 7 days	5	16.6
> 7 days	3	10
	Frequency of Animal Body Inspection	
1 - 2 days	16	53.3
3 -4 days	2	6.7
7 days	5	16.7
> 7 days	7	23.3
	frequency of Animal rear Hinds inspection	
1 - 2 days	23	76.7
3 -5 days	3	9.9
7 days	4	13.3
	Harness Storage	
on a thatch roof	2	6.7
on the field	6	20.0
on the ground at home	22	73.4
	Harness Stitching	
to the outside	15	50
to the inside	15	50
	Presence of signs of Loss of Hair on the Animal's Body	
yes	12	40
no	18	60

Table 6 Plough Condition and Care

	Frequency	Percent
	Measures followed to Inspect the Plough Before Work (n=30)	
nothing	1	3.3
sharpening the shear	11	36.7
general inspection	16	53.3
dismantling	2	6.7
	Measures followed to Inspect the Plough after Work (n=30)	
cleaning	17	56.7
observation	11	36.7
nothing	1	3.3
dismantling and check	1	3.3
	Measures followed to Inspect the Plough at the end of the season (n=30)	
storage in the house	13	43.3
stripping the plough	8	26.7
general inspection	6	20
nothing	1	3.3
replacing the spare parts	2	6.7
	Indicators of Rust on the Implement (n=30)	
present	15	50
Not present	15	50
	Receiving Training on Plough Maintenance (n=30)	
training received	19	63.3
Training not received	11	36.7
	Plough Storage at the end of the Working Day (n=30)	
on the ground at home	22	73.3
in a store	8	26.7
	Plough Storage at the end of the Season (n=30)	
in a store	15	50.0
at home	15	50.0
	Knowledge on Routine Maintenance at the End of the Work Day and Season (n=30)	
yes	18	60
no	12	40
	Source of Knowledge	

	(n=18)	
Peer Farmers	16	89.9
NGOs/ Practical Action	2	11.1

Table 7 Field capacity and efficiency (n=30)

	Frequency	Percent
	Field Capacity (hah/h)	
0.09 ha/h and less	13	43.2
0.1 - 0.13 ha/h	8	26.6
0.14 - 0.19 ha/h	5	16.7
> 0.20 ha/h	4	13.2
	Field Efficiency (%)	
50	2	6.7
60 - 69%	3	10
70 - 79%	5	16.6
80 - 89%	8	26.7
> 90%	12	39.9