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Assessing The Effectiveness Of The Drought Coping Strategies Practiced Among Farming Communities In Northern Part Of Jigawa State, Nigeria

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Abstract: ***The study was conducted purposely to assess the effectiveness of the drought coping strategies adopted on crops and livestock in northern part of Jigawa state. Multi stage and purposive sampling techniques were used in the selection of the study area and the 3 purposively selected LGAs namely; Babura, Sule-Tankarkar and Maigatari. Data for the study was collected using semi-structured questionnaire. A sample size of 384 respondents obtained from all the 32 farming communities in the 3 selected LGAs was used. Raw data gathered from the survey was summarize in Microsoft Excel and analyzed using descriptive statistics that is mainly the use of tables, frequencies and percentages. Likert scale was also used to rate farmer's knowledge on drought incidence. Findings of the study revealed extent of farmer's knowledge and experience on drought. However, major coping strategies practiced on crops include; mixed cropping, differing of sowing date, using special farming implements, crops diversification through adoption of improved seeds and prayers and supplications. The study also revealed using supplementary feeds as a major coping strategy adopted on livestock during drought. Therefore, the methodology employed and the results obtained from this study could be usefully applied to other areas suffering from similar negative effects of drought on agricultural production.***

Keywords: Drought, Coping Strategies, Farming Communities, Northern part of Jigawa State

I. INTRODUCTION

BACKGROUND

There is a great diversity rather than unanimity in the extensive literature on the meaning of drought. Thus while mankind remains unanimous on its impact and regarding it as a pervasive climatic burden, the term "drought" is always entangling in a web of definitions that are blessed on the basis of human activity it is affecting, or even its location or occurrence, hence establishing a universal view about it might be difficult. Thus, there is no universally accepted definition of drought, because unlike other natural disasters drought is not a distinct event, it is often the result of many complex factors acting on and interacting within the environment. Complicating the problem of drought definition is the fact that drought has neither distinct beginning nor end period. It is usually recognizable only after a period of time and because a drought may be interrupted by short dry-spells of one or more wet months, its termination is difficult to recognize, thus drought is a relative, rather than absolute condition that should be defined for each region and each drought differs in intensity, duration, and spatial extent (Angel, 2008).

There are numerous examples of more rigorous definitions which tend to employ either a threshold value for example, the U.K Met. Office employs fifteen consecutive days without rain while Russia employs ten consecutive days when the total rainfall does not exceed five millimeters, or statistical value, like; 'twice the standard deviation', 'below the average rainfall' as used in India or 'seventy percent of normal rainfall' as used in South Africa. Others employs vague terms such as 'below normal', 'deficient precipitation' and 'less than average' (NDMC, 2000). Mortimore, (1989) suggested that drought is "a deficiency of rainfall significantly

below normal or expected amount for a period in question (a year, a rainy season, a month or less)". Here while the author included the temporal element of rain, the spatial and human significance were silent. The author used the term 'normal' in reference to international convention that regards average precipitation over a thirty (30) years period as normal.

Drought, at least for the purpose of this study, can be viewed from agricultural perspective as a lack or shortage of expected precipitation in an area over time long enough to disrupt normal crop and livestock production. However, to agriculturalists, drought can only occur in areas which normally receive adequate rainfall capable of sustaining established agricultural practices. When such areas suffer from shortage or abnormal distribution of rains resulting in partial or total crop failure, the condition is described as drought.

This phenomenon called drought occur throughout the length and breadth of northern Nigeria, especially within the dry belt of the Sudano Sahelian states of Kebbi, Sokoto, Zamfara, Katsina, Kano, Jigawa, Yobe, Gombe and Borno were it is found to be associated with a late start and early cessation of the rains, resulting in drastic reductions in the length of the rainy season. This is because studies within the region have shown a significant trend towards false onset (is a situation where the rainy season starts normally and then ceases abruptly, creating a dry period between the false onset and the true onset), late or delayed onset (late or delayed onset is a situation where the expected start of the rainy season is delayed) and early cessation (which refers to a situation where the rainy season stops before the expected time) of the summer rains over a thirty years period from 1969 to 1998 (Camberlin and Diop, 2003). Also a study conducted by Sawa (2010) using a daily rainfall record of thirty years period from 1975 to 2005 for fifteen selected meteorological stations in northern Nigeria revealed that places in the Sudano Sahelian region of northern Nigeria are already experiencing the impact of global climate change in form of increasing numbers of short dry spells during the rainy season from May to September of the years under study.

PROBLEM STATEMENT AND JUSTIFICATION

In northern part of Jigawa sate however, most of the farming communities are primarily oriented towards subsistence agricultural practices which should naturally be rainfall dependent, but insufficiency and irregularities in the amount and distribution of the rains has been triggering drought in the area (Fidelis, 2003). Food and Agricultural Organization (2002) noted that communities that have lived under drought situations for many generations tends to developed coping strategies to lessen the impact of drought and alleviate food shortages. This is the reason why in an attempt to survive the situation and earn a living, farmers in the study area for years have resorts to the practice various coping mechanisms on crops, livestock and families so as to deal with the challenges of drought. Therefore, such knowledge needs to be studied and assess to check whether they are effective or otherwise. This is necessary because for many farmers, a farm exists as an income, a lifestyle, and a home, because farms are often passed down through generations through inheritance and are the legacy left for future generations, the prospect of losing a farm creates a great deal of stress for all the family members (Alston, 2007).

II. MATERIALS AND METHODS

THE STUDY AREA

Babura, Gagagrawa, Garki, Gwiwa, Gumel, Kazaure, Maigatari, Ringim, Roni, Sule-Tankarkar and Taura, Yankwashi local government areas (LGAs) constituted northern part of Jigawa state. The area lies geographically between latitudes 13.00^0N to 14.00^0N and longitudes 8.00^0E to 9.00^0E. To the north it shares boundary with Katsina state and Zinder region of Niger Republic, Kano state to the west, Dutse, Jahun, Miga, and Kaugama LGAs to the east and south (figure 1). The study area is estimated to be inhabited by 518,665 persons (NPC, 2006).

The study area has the characteristics of semi-arid to arid conditions characterized by a long dry season and a short wet season and they are frequently under threat of drought and desertification. The climatic variables are erratic and vary considerably over the year. Mean annual temperature is about 25°C but mean monthly values ranges between 21°C in the coolest month and 31°C in the hottest month. However, mean daily temperature could be as low as 20°C during the months of December and January when the cold dry harmattan wind blows from the Sahara desert, while maximum daily temperatures reaches up to about 42^oC between the months of March to September. Cooler temperatures as low as 10^oC are recorded during harmattan season between the months of October and February especially at night times. There is also a substantial day time/night time temperature variation during this period (Jigawa State Government Diary, 2001).

Wet season is roughly four months (June to September) although in the last several years rainfall was recorded in October, and dry season is seven to eight months (October to May). The rainy season sometimes starts in May, but early rains that start in April are not unusual, the bulk of the rainfall however, starts in June through September. The rainfall is characterized with violent dust storms, followed by lightening which usually heralds the onset of the rains in May and June and their retreat in September or early October. The total annual rainfall received in the area is about 600mm with grater temporal variations occurring in the amount of rainfall received (Jigawa State Government Diary, 2001).

The economy of the study area relies largely on agriculture were over 80% of the engaged in crop production which was restricted only during the rainy season and is mainly on subsistence basis, with farmers averagely cultivating about 2.5 hectares (Ado, 2012). Major rainfed crops cultivated include; millet, sesame, cowpea, groundnut and sorghum. Livestock such as cattles, sheep, goats, poultry and donkeys are also very common in the state (JARDA, 2005). This was made possible because of two reasons; first, the area enjoys a fair share of all the major natural resources for agricultural developments as land, vegetation, water and long duration of sunshine hours, secondly, a vast fertile arable land to which almost all tropical crops could adapt (JARDA, 2005).

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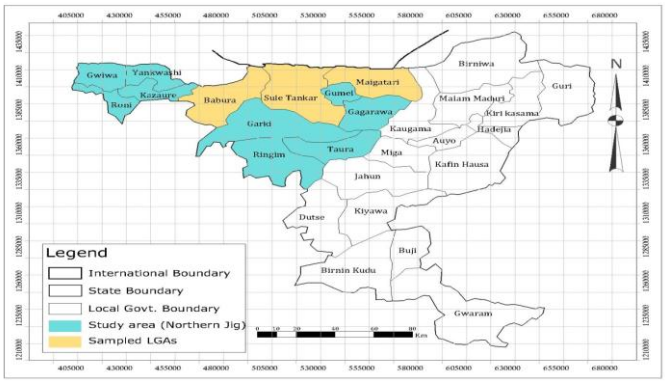

Figure 1: Jigawa State Map Showing the Study Area and the Three Sampled LGAs

SAMPLING, DATA COLLECTION AND ANALYSIS

This study was conducted in Northern part of Jigawa state (Figure 1). This area was chosen because over 80% of the populace engaged in subsistence farming which should naturally be rainfall dependent, but insufficiency and irregularities in the amount and distribution of the rains has been triggering drought in the area which rendered the area food insecure a situation that is directly linked to adverse climatic condition with drought as the main driver. The rural farming communities who are dependent on agriculture constituted the target population while the unit of analysis was the household. The household head was the unit of observation. Multistage and Purposive sampling techniques were used in the selection of the study area and the 3 local government areas. A representative sample size of 384 households from the 32 faming communities was used in this study. Data was collected using field observations and questionnaire survey. Standard procedures with focus on descriptive statistics that is mainly the use if tables, frequencies and percentages were used in data analysis.

Selected LGAs	Farming Communities in the selected LGA	Number of Questionnaires Distributed	Number of Questionnaires Used for Analysis
Babura	Batali	12	11
	Batali	12	10
	Dorawa	12	12
	Garu	12	12
	Gasakoli	12	10
	Insha-Ruwa	12	12
	Jigawar Dan Ali	12	11
	Kanya	12	12
	Kuzumzumi	12	12
	Kyambo	12	11
	Takwasa	12	10
	Sub-Total	**132 (100%)**	**123 (93.2%)**
Maigatari	Balarabe	12	8
	Dan-kumbo	12	12
	Fulata	12	9
	Galadi	12	7
	Jajeri	12	11
	Kukayasku	12	10
	Madana	12	8
	Matoya	12	12
	Maigatari-Arewa	12	10
	Maigatari-Kudu	12	11
	Turbus	12	12
	Sub-Total	**132 (100%)**	**110 (83.3%)**
Sule-Tankarkar	Albasu	12	12
	Amanga	12	9
	Dalladi	12	12
	Dangwanki	12	9
	Danzomo	12	11
	Jeke	12	10
	Shabaru	12	10
	Sule-Tankarkar	12	12
	Taka-Tsaba	12	12
	Yan-Damo	12	10
	Sub-Total	**120 (100%)**	**107 (89.2%)**
	Grand Total	**384 (100%)**	**340 (88.5%)**

Source: Field Survey, 2015

Table 1: Number of Questionnaires Distributed and Retrieved for Analysis

III. RESULTS AND DISCUSSION

SOCIO-ECONOMIC PROFILE OF THE RESPONDENTS

Age, gender, marital status, level of education, duration of farming experience and farm size were found to have a significant role with regard to adoption of any agricultural practices. For example; farmer's age in correlation with farming experience has significant influence on decision-making process with respect to adoption of improved agricultural technologies and other production related decisions.

Variables	Frequency	Percentage
Age (years)		
< -20	25	7.3
21-30	65	19.2
31-40	84	24.7
41-50	103	30.3
51- and above	63	18.5
Total	340	100
Gender		
Male	325	95.6
Female	15	4.4
Total	340	100
	Marital Status	
Married	253	74.4

Single	72	21.2
Widow	15	4.4
Total	340	100
Literacy Level		
Qur'anic education	88	25.9
Adult literacy	43	12.6
Primary school	52	15.3
Junior secondary school	37	10.9
Senior secondary school	58	17.1
Tertiary	62	18.2
Total	340	100
Farming Experience (years)		
< - 05	48	14.1
05-10	69	20.3
11-20	81	23.8
21-30	92	27.1
31- above	50	14.7
Total	340	100
Farm Size (hectares)		
<-05	169	49.7
5-10	133	39.1
11-above	38	11.2
Total	340	100

Source: Field Survey, 2015.

Table 2: Socio-Economic Profile of the Respondents (n=340)

The result in table 2 revealed that majority (30.3%) of the respondents falls between 41-50 years, then 31-40 age bracket with 24.7%, then 51 years and above with 18.5%, then 21-30 with 19.2%, then <20 years with only 7.3% of the respondents who engaged in farming. This result indicated that, most of the respondents engaging in farming are matured adults with experience in drought and having higher chances of devising coping techniques.

Table 2 also depicts gender compositions with male headed household accounting for greater percentage (95.6%) of the respondents interviewed. While a very negligible fraction (4.4%) have been identified as female headed household. Therefore, this domination of male headed households could be attributed to the cultural and religious values of the communities under study. Genanet (2007) stated that, participation of women in decision making regarding the practice of drought coping strategy is very low.

Table 2 also shows marital statuses of the respondents with married respondents accounting for larger proportion (74.4%). Then followed by 21.2% who are single. Only 4.4% are identified as widows. This domination of married respondents was due to the fact that most of the areas covered by the study are rural and also farmers interviewed are mostly above 40 years of age. Ideally is very rare to find an adult of 40 years of age in rural areas living without family.

The result went further to shows that majority (32.3%) had family size above 16 members, then those (29.1%) with family size of between 6 to 10 members, then those (21.5%) with family size of between 11 to 15 members, then followed by (17.1%) those respondents who had family size between 1 to 5 members.

Lin (1991) observes a positive relationship between the education level of the household head and his/her ability to practice drought adaptation. As such, farmers with higher levels of education are more likely to perceive drought and device adaption options better. The results in table 2 show that majority (25.9%) of the respondent had Qur'anic education; followed by those (18.2%) who reached tertiary level; then those (17.1%) with adult literacy as their educational background. However, the result also shows that 15.3% acquired primary education, 12.6% completed junior secondary education and 10.9% have completed secondary school.

With regards to years of farming experience the results presented in table 2 show that majority (27.1%) of the farmers had between 21-30 years of farming experience, then those (23.8%) who had between 11-20 years, then those (20.3%) who had between 05-10 years of farming experience, then followed by those (14.7 %) with 31 and above years in farming, then followed by those (14.1%) with < 5 years in farming. The result implies that majority of the respondent's falls within farming duration of 21 to 30 years which was good for the study because those farmers who spend many years in farming have more experience with drought incidence and thus have been coping more effectively for long.

The results also show that, majority of the households (49.7%) cultivated farmlands less than 5 hectares; then those (39.1%) who cultivated farmlands ranging between 5-10 hectares; then followed by the least (11.2%) who are cultivating farmlands from 11 hectares and above.

KNOWLEDGE AND EXPERIENCE ON DROUGHT

It is important to understand farmer's knowledge and experience on drought so as to have an insight into their past and present experiences

Variables Surveyed	Frequency	Percentage
Local signs of drought prediction		
Agree	190	66.0
Disagree	98	34.0
Total	288	100
Sources of information on drought		
Radio	87	30.3
Farmers union	44	15.3
Farmer to farmer	69	24.0
Friends	21	7.3
Newspapers/Magazines	13	4.5
Extension workers	54	18.6
Total	288	100
Perceived causes of drought		
Nature	110	38.2
Man misuse of the environment	72	25.0
Climate change	58	20.1
Strong winds blowing from neighboring Niger Republic	48	11.7
Total	288	100

Source: Field Survey, 2015.

Table 3: Knowledge and Experience on Drought

The result in table 3 shows that majority (66.0%) of the respondent's uses local signs to predict drought. For example the farmers told the researcher that when large number termites were found in the mound, drought is the immense issue for the year. Also when black ants (Tururuwa) were spotted storing grains in safer places is a clear indication that rain will follow for a couple of days and then drought will

strike at the end. Among the local sing used to predict drought in the area is when pigeons are spotted lying on the ground and spreading their feathers. Early leafing of baobab tree (Adansonia digitata) is also a sign of possible drought occurrence. In contrast to the above, only small fraction (34.0%) of the farmers asserted that they cannot predict drought.

With regards to sources of information on possible drought occurrence, the result show that 30.3% received drought information through radio sets, 15.3% via farmers union, 24.0% through farmer to farmer, 7.3% from friends, 4.5% via newspapers and magazines, while 18.6% through extension workers. However, this result show the major role the broadcasting media (radio in particular) is playing in disseminating drought early warning information.

The result went further to portray respondent's differential perception with regard to causes of drought were 38.2% believed drought comes naturally from god as a sort of punishment for the sins people are committing which is as equal as inviting the wrath of god which usually manifesting in the form of drought; then followed by 25.0% who believed that drought was due to man's misuse of his environment arising from massive deforestation and degradation of natural forest mainly for fuel wood extraction, expansion of farmlands and erection of buildings; then followed by 20.1% who linked drought to the issues of global climate change. This was then followed by 11.7% who linked drought occurrence with the strong winds blowing from the neighboring Niger republic especially during the months of June to July. This strong wind has the tendency of blowing off the rains by dispersing the clouds.

INDIGENOUS DROUGHT COPING STRATEGIES ADOPTED ON CROPS

The survey conducted revealed different coping responses to drought indigenously.

Coping Strategies	Babura (N=105		Maigatari (N=90)		Sule-Tankarkar (N=93)	
	Freq	%	Freq	%	Freq	%
Dry soil planting	25	23.8	25	27.8	30	32.2
Mixed cropping	98	93.3	78	86.7	80	86.1
Adapting wide spacing of crops	68	64.8	28	31.1	22	23.7
Reducing farm size	57	54.3	32	35.5	26	28.0
Differing of sowing date	92	87.6	64	71.1	64	69.0
Delaying farm clearance until first weeding	31	29.5	22	24.4	15	16.1
Planting on un-plough farmland (*Dambare*)	62	59.1	52	57.8	38	40.9
Early weeding	48	45.7	46	51.1	49	52.7
Repeated weeding	37	35.2	18	20.0	22	23.6
Use of special local farming tools	89	84.8	73	81.1	51	54.8
Prayers and supplications	79	75.2	60	66.7	59	63.4

Source: Field Survey, 2015.
Note: Multiple Responses Accepted.
Table 4: Indigenous Drought Coping Strategies Practiced on Crops

The result in table 4 show that in Babura LGA, majority of the farmers (93.3%) adopted mixed cropping system. Then followed by those (87.6%) who differed their sowing date. This was then closely followed by those (84.8%) who adopted the used of special local farming implements. This was then followed by those (75.2%) depend on prayers and supplications when ever drought strikes. This was followed by those (64.8%) who adopted the practice of wide spacing between rows and stands. This was then closely followed by those (59.1%) who plant on un-plough farmland. This was followed by those (54.3%) who reduces the size of their farms in order to minimize loss because of a significant drop in annual yield been experienced in the study area which can be linked directly to drought. Next are those (45.7%) who adopted early weeding and thinning. This was followed by those (35.2%) who practices repeated weeding so as to cope with the impact of moisture shortage posed by drought. This was followed by those (29.5%) who delayed farm clearance until rains are well established, and soils are more compacted thereby reducing the effects of strong wind on sprouting crops. This was followed by the least proportion (23.8%) that practices dry soil planting (binne).

However, in Maigatari LGA a slight variation was observed with that of Babura LGA were majority of the farmers (86.7%) adopted mixed cropping system, then followed by those (81.1%) who adopted the used of special local farming implements. This was followed by (71.1%) who differ their sowing date. This was followed by (66.7%) that embarked on prayers and supplications when ever drought strikes. Then followed by those (57.8%) who plant on un-plough farmland. This was followed by those (51.1.0%) who practice early weeding and thinning. Then followed by those (35.5%) who reduces farm size. Then those (31.1%) who wider spaces between rows and stands of crops. Next are those (27.8%) of the farmers who embarked on the practice of dry soil planting. This was then followed by those (24.4%) who delayed farm clearance until after first weeding. Next are those (27.8%) farmers who practice dry soil planting when ever rainfall was delayed. Then those (24.4%) who adopted the practice of delaying of farm clearance until after first weeding. Then followed by the least category of farmers (20.0%) who increases the frequency of their weeding from the normal two per season to three or four times in a season.

Moreover, in Sule-Tankarkar LGA also the variation observed between the result of Babura and Maigatari

LGAs were not much significant showing only slight differences. Here majority of the farmers (86.1%) also adopted mixed cropping system. Then followed by those (69.0%) who practice differing of sowing date in order to cope with drought. This was then followed by (63.4%) who embarked on prayers and supplications when ever drought strikes. Then followed by those (54.8%) who adopted the used of special local farming implements. Then followed by those (52.7%) who adopted the practice of early weeding and thinning. This

was then followed by those (40.9%) who adopted planting on un-plough farmland. Next is that category (32.2%) of farmers who are embarking on the practice of dry soil planting. This was then followed by those (28.0%) that reduces the size of their farms in order to minimize loss from drought. Then followed by those (23.7%) who adopted the practice of wide spacing between rows and stands of crops. This was followed by those (23.6%) who adopted the practice of extending their weeding from the normal twice in a season to at least three or four times in a season. Delaying of farm clearance until after first weeding was the least in adoption with a significant fraction (16.1%) of farmers.

NON-INDIGENOUS DROUGHT COPING STRATEGIES ADOPTED ON CROPS

Non indigenous techniques of coping with drought are those strategies that emerged with the advent of science and technology. These strategies were normally introduced to farmers by extension agents.

Coping strategies adopted	Babura (N=105)		Maigatari (N=90)		Sule-Tankarkar (N=93)	
	Freq	%	Freq	%	Freq	%
Crop diversification	41	39.0	39	43.3	22	23.7
Using chemicals in pest and weed control	26	24.8	32	35.6	37	39.8

Source: Field Survey, 2015.
Note: Multiple Responses Accepted.
Table 5: Non-indigenous Drought Coping Strategies Adopted on Crops

Crops diversification refers to growing new species of improved crop varieties, it is a technology aimed at mitigating the effects of increasing climate variability and building crop resilience to environmental stresses. However, available documented literatures have shown that the use of drought resistant and early maturing cultivars has been tried by smallholder farmers as adaptation method to drought in Nigeria, Senegal, Burkina Faso and Ghana (Ngigi, 2009). The results in table 5 show that Maigatari LGA was the highest (43.3%) in practicing crop diversification, then followed by Babura LGA with (39.0%). Sule-Tankarkar LGA was the least (23.7%) in adoption.

Incidences of insects and pests increased significantly with the phenomenon of drought. However, the result also revealed adoption of this technology. Sule-Tankarkar LGA was the highest (39.8%) in adopting this technology; then Maigatari LGA (35.6%), and then Babura LGA with the least (24.8%). Most of the farmers interviewed stated high cost involved in purchasing chemicals as their barrier to the practice of this strategy.

DROUGHT COPING STRATEGIES ADOPTED ON LIVESTOCK

Major problem facing the farmers in the study area during drought is how to maintain feed supplies to their livestock. Thus responses to these feeding problems were presented in table 6 below.

Coping strategies adopted	Babura (N=68)		Maigatari (N=73)		Sule-Tankarkar (N=70)	
	Freq	%	Freq	%	Freq	%
Reducing number of livestock	52	76.5	47	64.4	56	80.0
Using supplementary feeds	63	92.6	69	94.5	58	82.9
Reducing number of feeding per day	43	63.2	51	69.9	44	62.9
Using stored feed mostly crop residues obtained during good harvest.	37	54.4	29	37.7	22	31.4

Source: Field Survey, 2015.
Note: Multiple Responses Accepted
Table 6: Drought Coping Strategies Adopted on Livestock

The result in table 6 shows that, in Babura LGA majority (92.6%) opined to providing supplementary feeds for their livestock. Feeds used in the supplementation include; wheat offal, cotton seed cake, seeds and leaves of *Faidherbia Albida* popularly known as *Gawo* in Hausa language, leaves and pods of *Parkia Filicoidea* known popularly as *Dorawa* in Hausa are all harvested to feed animals during drought period. However, seeds of *Prosopis Africana* known in Hausa language as *Kirya* and that of *Piliostigma Reticulata* popularly called *Kalgo* in Hausa language are grinded into powdery form and used as livestock feed. Then followed by those (76.6%) who sell their animals This was followed by those (63.2%) who reduces number of feeds per day thereby sending their livestock to graze the bush a practice popularly called *Sakayya* in Hausa language. This was followed by those (54.4%) who uses feeds stored from good season which includes crop residues like corn stalk of millet and sorghum, groundnut and beans stover and dry grasses (hay).

However, in Maigatari LGA, majority of the farmers (94.5%) also uses supplementary feeds then followed by those (69.9%) who reduces number of feeding per day. This was then followed by those (64.4%) who reduces number of livestock. This was followed by those (37.7%) who are feeding their livestock from feed stored during good harvest.

In Sule-Tankarkar LGA however, the results of the survey presented in table 6 show some similarities as also majority (82.9%) stated using supplementary feeds, then followed by those (80.0%) who adopted reduces number of livestock. This was followed by those (62.9%) who are reduces number of feeds per day. The least number of farmers (31.4%) adopted the practice of feeding livestock from feed the stored during good harvest.

IV. CONCLUSION

The study sought to investigate drought coping strategies practiced in Northern part of Jigawa state and to assess their effectiveness as coping mechanisms. It is evidently clear that, the rural farming communities in the study area are proactively doing something for their survival during drought. Fortunately, they have knowledge on drought and can even locally identified indicators of its occurrence. It is also visibly clear that over time farmers in the study area were able to develop and fine-tune such strategies which made their farming system so resilient to drought. Therefore, these coping initiations have some logics and ethics that need to be documented, shared and disseminated to other farming communities in areas with similar ecological problem in the dry land region of northern Nigeria. From the results of the study it can be deduced that the capacity for coping with drought is a function of various factors such as the relative contribution of many factors such as dry planting, the efficient use of every drop of rain that falls through early planting and staggered planting dates. Hence, the study concluded that, the numerous strategies adopted by farmers on crops and livestock proved effective in enhancing their livelihood to the extent that such strategies have become important determinants of food security situation in the study area. Thus, in most cases they have something to fall back on when ever drought occurs.

V. RECOMMENDATIONS

The study recommended that farm clearance before the onset of the rainy season needs to be discouraged because it usually exposes the bare soil to erosion by strong wind occurring during the early onset of the rain. Thus, in its place farmer's need to delay their farm clearance until after first weeding. Also there is a need to have a well coordinated system through which drought early warning information like the Seasonal Rainfall Prediction (SRP) issued annually before the onset of each rainy season by the Nigerian Meteorological Agency (NiMet) can easily and quickly be interpreted, disseminated and explained to farmers and advice them on the measures to adopt. Since majority of the farmers in the study area suffers from shortages of food during some months of the year due to the absence of irrigation facilities which restricted food production to only rainy months, the study recommends that, government should provide irrigation facilities as this will enable the rural farmers in the study area to have an opportunity for practice irrigation during dry season so as to complement the gap created by drought.

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