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USAID WULA NAFAA

CONSERVATION FARMING TECHNICAL TRAINING & SUPPORT

January 2010
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1. BACKGROUND INFORMATION

This technical training consultancy was carried out by Mike Mailloux, an independent Conservation Farming Expert, on behalf of the Cooperative League of the United States (dba NCBA) for the Wula Nafaa (WN) project and the USDA-funded Millet Value Chain Project. The technical training took place in the rural community of Fass Koto, Senegal (Tambacounda Region) from January 5, 2010 to January 24, 2010. The technical consultancy also developed, with six project-identified local blacksmiths, plans to test the feasibility and viability of locally manufactured Conservation Farming (CF) animal ripping equipment and hoes.

1.1. CONSERVATION FARMING

Conservation Farming is a min-till hoe and animal draft system that arose from the Mid-Western region of the United States as a result of the Dust Bowl. Prior to the 1930s, US farmers prepared their lands using conventional plowing equipment and techniques. The result from this overall soil disturbance in conjunction with a number of drought years was the Dust Bowl. As a result, a number of US farmers began to till and prepare their land where they were going to actually place their inputs and plant their crop, thus minimizing the overall soil disturbance. This minimal soil disturbance and the precision that arises from having a permanent grid of planting stations and furrow lines is what CF is all about. It is about getting the land preparation and tillage correct upon which all other above-ground activities and systems can be integrated – e.g. composting, organic, crop rotations, IPM, etc., and upon which all are dependent.

CF is not new to Africa, having been practiced in Zimbabwe for around 20 years and in Zambia since 1996 under the technical support and supervision of the Zambian Conservation Farming Unit (CFU). In Zambia there are currently 100,000 CF Hoe and Oxen practitioners. The current CFU-managed Conservation Agricultural Program (CAP) is funded by the Royal Norwegian Embassy and is expected to run through 2015 and target an additional 140,000 small holders. The qualitative and quantitative results experienced by small holder adopters from the CFU's CF activities have been both substantial and impressive. A series of well documented reports and case studies supporting yield, food security, and farm gate income increases can be sourced from a number of independent sources and can be supplied upon request.

In addition to the creation of correctly measured and permanent planting basins for hoe farmers and rip lines for animal draft farmers, CF integrates a number of practices that in combination conserve soil, moisture, inputs, energy, time, and money. The non-burning and in-field retention of crop residues protects the soil from the damaging effects of rain splash as well as reducing run-off and increasing moisture retention and in-field rain harvesting. The permanent grid of planting hoe basins and animal draft rip lines optimizes the application and use of organic and inorganic agricultural inputs by ensuring their placement where those inputs are needed – just under the planted seeds. Finally, by spreading out land preparation over several months (experienced CF farmers spend 1-3 hours per morning laying out and digging their basins and rip lines before attending to other farm gate activities) allows CF farmers to be ready for the first crucial planting rains. This is vital since a Nitrogen flush occurs with and only with the first heavy planting rains. Farmers who prepare their land and plant late often lose a substantial

volume of their potential yield – between 1-2% for every day that the farmer is late after those first heavy planting rains.[1]

1.2. OVERALL OBJECTIVES

The overall objectives of this technical consultancy were to contribute to the achievement of the USAID/Senegal Mission's Strategic Objective 1 (SO 1): Increase Economic Growth through Trade and Nature Resource Management. By increasing farmer yields through the integration of min till CF Hoe and Animal Draft practices, overall food security and marketable crop surpluses for trade would be increased. Increasing the existing soil fertility and structure of small holder land holdings through the retention of crop residues, optimal use of inputs, and crop rotations along permanent planting basins and rip lines ensures that both land degradation is slowed down and yields are increased within current land holdings – alleviating in part the pressure on the part of small holders to cultivate larger land holdings or to encroach on virgin lands.

The first step towards the overall objective was undertaken by WN during a small pilot phase that was successfully carried out with 15 farmers from July – September 2009. The overall positive results from this pilot test are documented in two separate reports.[2] The pilot was well managed and the results were accurately tabulated and collated. More importantly, it set the stage for the second step – undertaken by this consultancy in which 32 field based trainers (16 project Field Facilitators, 10 Lead Farmers and 6 project partners) were trained in both min till CF Hoe and Animal Draft techniques. This group of trained field staff will then work with around 1,300 small holders to set up a series of on-farm trial and demo plots in 19 targeted rural communities.

In addition to the planned expansion, 6 local blacksmiths were identified as possible manufactures and suppliers of CF Hoe and Animal Draft equipment. The 6 local blacksmiths were allowed to test the equipment during field runs. Manufacturing and costing plans were also developed in conjunction with the 6 local blacksmiths.

It is also envisioned after the successful implementation of the planned upcoming expansion phase that farmers will be able to identify local in-community service providers who will be interested in providing quality CF Animal Draft ripping services. In-Community Service providers and farmers who participated in the expansion phase may also express an interest in becoming service providers after the results are tallied upon the successful completion of the expansion phase.

Finally, technical training and work expansion plans were developed with key WN field staff. These plans are included in this final report.

1.3. KEY RESULTS

During this technical consultancy the following five key results were achieved in whole (R1, R2, R3 and R4) or as in the case of R5 will be an on-going activity till the end of the expansion phase. The five key results successfully completed during this technical consultancy were:

Result 1 Strengthened technical training capacity and knowledge of 13 field staff and 4 collaborating partners; plus 8 farmers for ripper and hoe techniques.

Result 2 CF Hoe and Oxen Technical manuals would have been developed in French.

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[1] CFU Peter Aagaard, 2000.

[2] USAID Wula Nafaa (Rapport De La Visite D'Echange Sur La Conservation Farming), November 2009. Compte Rendu De Mission (Suivi Des Champs De demonstration Utilisant Le Technique De 'CF'), L. Gomis September 2009.

Result 3 Business Delivery Service Manual would have been developed in French.

Result 4 A strategy to promote CF through service providers is proposed.

Result 5 In order to convince farmers to invest in CF, a documentary film or slide show will be prepared as communication support to explain the technical procedures, the use of the tools and compare the performances for both manual and ox farming systems.

The following sections outline the key activities and steps that need to be carried out during the expansion phase.

2. RESULT ONE: STRENGTHENED TECHNICAL TRAINING CAPACITY AND KNOWLEDGE OF 13 FIELD STAFF AND 4 COLLABORATING PARTNERS; PLUS 8 FARMERS FOR RIPPER AND HOE TECHNIQUES.

A total of 16 project field staff, 10 project Lead Farmers and 6 collaborating on-the-ground partners were trained in CF Hoe and Animal Draft technical techniques. The training focused around the following key five practices:

1. ***Correct Site and Field Selection*** – During this technical session participants learned two in-field tests that they can easily employ to test their soil and any hard pans that may exist in their field. The field soil test involves taking a small soil sample and mixing the soil with water to test the soil composition to make sure that the targeted field is not too sandy or too clay like in structure. Heavy clay and very sandy soils are inappropriate for a variety of reasons and should be avoided when at all possible. This simple test will also help farmers choose the best possible sites to set up their on-farm demo plots and trials during the expansion phase.

2. Participants also field tested another simple soil structure test to determine if a hard pan exists in the targeted field. Hard pans arise from continually plowing the same field over a continuum number of seasons. Hard pans usually occur between 15 and 20cm deep and will inhibit and prevent plant roots from tapping into any nutrients, minerals and moisture that may lie just below this 15-20cm level.

3. ***Residue Retention*** – During this session participants were able to compare the water retention and organic properties between a parcel that had residue cover and a parcel that had no residue cover.

4. While it will not be possible to have large volume of residue on targeted demo and on-farm plots cover during the expansion phase due to the lack of ample bio-mass, farmers should not burn their residues and allow the existing level of residues to be incorporated back into the soil via the normal natural decomposition processes that occur in Senegal. Even if livestock eat most of the existing residues, animals during the course of consuming crop residues will also leave organic manure on the field. Animals also tend to by walking back and forth across a field push some residue cover into the ground where it is then naturally decomposed and available as a natural fertilizer. The key to the expansion phase will be to insist on participants not burning the existing cover.

5. Some farmers may import vegetative matter (usually from field boundaries) to act as a form of residue cover. While this might be useful and will usually demonstrate the importance and

benefits of having residue cover in-tact on a field, care must be taken that any vegetative matter imported into the demo plot does not contain seeds. This will only add to the existing weed problem and can become very burdensome to the farmer having to control the extra weeds as well as being detrimental to any potential final yield results.

6. ***CF Min Till Land Preparation*** – During this technical session participants learned the importance of creating ropes to measure both their fields and distances between planting rows and between planting basins within those rows. Many farmers do not measure their fields due to the lack of equipment (measuring tapes, counters etc.) or estimate their sizes using footsteps, arm lengths etc – this can lead to widely different field sizes which in turn can lead a farmer to think he or she has a final yield that is higher or lower per the field size than it really is. This is a common problem in Zambia and one that also needs to be addressed by using measuring ropes. During August and October 2009, the consultant measured 15 Zambian CF farmer fields and without exception all 15 farmers had thought that there fields were larger or smaller than they actually were.

7. During the expansion phase, it is vital that all demo plots and on-farm plots are measured properly and accurately. It is imperative that the Field Facilitators check each measuring rope (both the rope used to measure the surface area of the holding and the Teran rope – used to measure distances between rows and between planting stations) as well as verify the actual size of the field that the farmer measured.

8. After the proposed site was selected, its soil tested and properly measured, participants were able to practice digging the planting basins (CF Hoe) and creating the furrow lines using the Magoye Ripper with both donkeys and horses.

9. ***Fertilizer and Manure Application*** – In Senegal, farmers normally broadcast spray their manure and fertilizer across the surface area of their fields. This is a very wasteful practice both in terms of time and money. It also inadvertently increases the availability of these inputs that are meant for the principal crop to weeds that in turn compete with the principal crop for nutrients, water, air and sunlight. Farmers need to put the manure and fertilizer where it is needed and that is directly under the seeds. Under CF, accurate placement of correct amounts of manure and fertilizer is possible due to the correctly measured planting basins and furrow lines.

10. ***Planting*** – Participants learned the correct planting rates and distances between seeds – it is important that correct rates are used in order to maximize the plan population. The importance of early planting with the first heavy planting rains in order to benefit from that all important Nitrogen flush was stressed throughout the technical training.

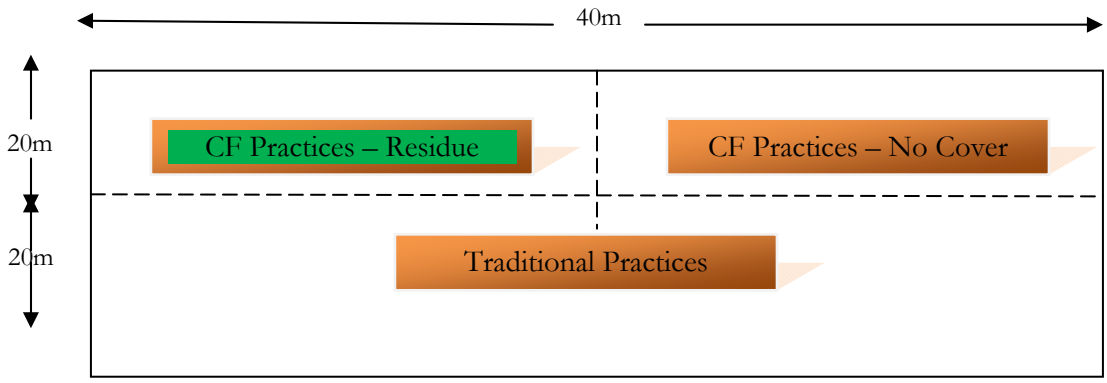
All technical training sessions involved some classroom time where the importance of and how to do each key practice was discussed. It is vital that farmers and field staff fully understand the why and how to of each practice prior to setting off to the practice field. If farmers in particular do not understand the importance of doing a practice and how to correctly do it, they will most likely not carry out the practice or not correctly carry out the required practice in full. This usually leads to less than desired results and the ensuing charges that a certain practice or system does not work or is not applicable to a certain situation. In all cases, after the understanding of the why and how to, all participants were able to receive ample in-field time to physically practice what they had discussed in the classroom. After each technical session, a question and answer period ensued in order to highlight and clarify any issues related to each technical session.

3. DEMO AND ON-FARM PLOT EXPANSION PLAN

WN has put in place a well thought out and practical plan to expand their July pilot into a full blown expansion. This section outlines the key points and activities that will guide this expansion. A total of 1,300 farmers and Lead Farmers will participate in this expansion under the direct supervision of WN Field Facilitators. The expansion plan will target 89 villages in 19 different rural communities. The technical training and work plan that will guide the five key technical practices that were covered during the technical training and other key activities is discussed in greater detail in ***section 3.2***

3.1. DEMO TRAINING PLOTS

All villages participating in the expansion phase will select 1-2 Lead Farmers from the 15 participating farmers. These Lead Farmers will set up and train farmers in two selected demo plots – one plot will use CF min till Hoe as the tillage system and the other will use CF Animal Draft to set up min till furrow lines. Each CF demo training plot will have a parcel with residue cover and a parcel without residue cover. Both CF plots will be compared at the end of the cropping season to an equally measured traditional plot. The diagram on the next page shows the layout of these demo training plots.



While participating farmers will assist, via the technical training in the partial set up of each demo training plot, it is the sole responsibility of each Lead Farmer to ensure that the demo training plot is correctly set up and managed throughout the expansion phase and beyond. Failure on the part of a Lead Farmer to correctly carry out training, demo training plot set up and on-going management of the plot should result in the immediate termination of this Lead Farmer.

It is strongly suggested as has been done in Zambia and Kenya that all Farmers and Lead Farmers sign contracts with the project clearly outlining their roles and responsibilities and the consequences for not satisfactorily fulfilling those roles and responsibilities. Copies of Lead Farmer Contracts for both animal draft and hoe activities are listed in ***Annex A*** at the end of this report. Contracts also quickly emphasize the importance that the project places on the expansion phase and activities under the phase.

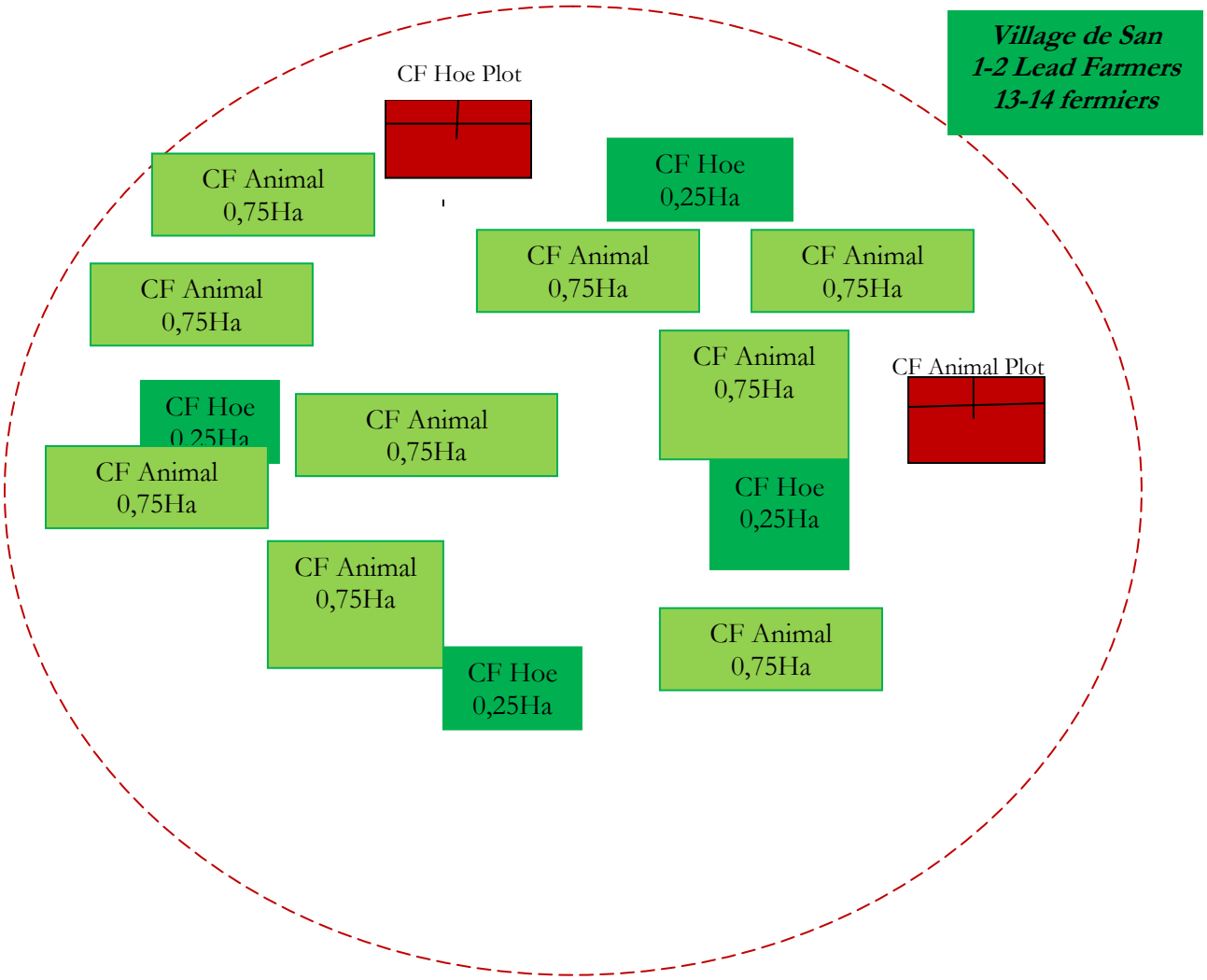
It is envisioned that these demo training plots will become permanent in-community training platforms and learning venues where future technical training and future expansions can be carried out.

3.2. ON-FARM PLOTS

A total of 13-14 farmers from each selected village will form a group of CF farmers. The sole purpose of these groups will be to receive correct technical training from their in-community selected Lead Farmers and to put into place on-farm CF Hoe and Animal Draft plots. The project would like to see 75-80% of the on-farm plots done with animal draft power with the remaining 20-25% of the on-farm plots done with CF Hoe practices. For CF Hoe plots the total surface area of the plot will measure a minimum of 0, 25 Hectare (1 Lima), while CF Animal Draft Plots will have a minimum surface area of 0.75 Hectare (3 Limas).

If a farmer is capable and willing to do more that these pre-set measures, they should be allowed to increase the surface area under CF. Under no circumstances will a farmer be allowed to do less than the project set surface areas. Careful consideration must be made of the farmer's ability and capacity to increase set surface areas during this phase. Incorrectly and poorly managed on-farm plots will lead to poor results and will or can act as a detriment to adoption and further planned expansions of the practices.

The diagram below outlines an example of how the system of on-farm and CF demo Training Plots will look like in selected villages and rural communities.



• ≈ 1 Hectare CF Hoe	• ≈ 6.75 Hectare CF Animal Draft
• 2-4 Farmers – CF Hoe	• 9-11 Farmers CF Animal Draft
• 1 CF Hoe Demo Training Plot – 1,600m2 (800m2 CF + 800m2 PP)*	• 1 CF Animal Draft Demo Training Plot – 1,600m2 (800m2 CF + 800m2 PP)
• 1-2 Lead Farmers	• 13-14 CF Farmers

PP – Pratiques Paysans

It will be important to concentrate the plots within a 10-15km radius so that intensive field support and monitoring can be quickly and efficiently carried out. This ensures that mistakes and problems related to plot set up and integration of CF practices can be quickly addressed. A tighter concentration of plots facilitates easier logistics for both project staff and participating farmers.

3.3. M&E FIELD SUPPORT FORMS

In order for both project field staff and Lead Farmers to effectively and quickly identify problems during each key step, a field monitoring form will be used by both field staff and Lead Farmers. These forms will also act as records for each participating farmer and will track when key activities were started and completed. Each farmer will have his or her own form that will be filled out by their Lead Farmers after field monitoring visits have been carried out. An example of the field monitoring form is outlined below:

M&E Field Support Form

Section A Bio-Data				
Farmer Name		Village/District		
Hoe/Animal Draft		Plot Size		
Section B – On-Farm Site Selection				
Activity	Start Date	End Date	Correctly Done (X)	If not – measures taken
Land Type (flat – no rocks, trees etc.)				
Soil Type Test Done				
Hard Pan Test Done				
Measuring Rope				
Section C – Land Preparation				
Activity	Start Date	End Date	Correctly Done (X)	If not – measures taken
Teran Rope Correct				
Residues on field				
Rows properly measured/marked				
Hoe – Basins Correct				
Animals – Furrows Correct				
Section D – Compost and Fertilizer Application				

Activity	Start Date	End Date	Correctly Done (X)	If not – measures taken
Compost Rates Correct				
Fertilizer Rates Correct				
Section E – Planting				
Activity	Start Date	End Date	Correctly Done (X)	If not – measures taken
Correct Rates				
Correct Spacing				
Correct Depth				
Planted – First Heavy Rains				
Section F – Weeding – Note the weeding method Used (Hand Hoe, Herbicide, or Animal)				
Activity	Start Date	End Date	Correctly Done (X)	If not – measures taken
1st, 2nd, 3rd , 5h and 5th weeding				
Section G – Yield				
Activity	Start Date	End Date	Correctly Done (X)	If not – measures taken
Yield Results correctly weighed				

Field Staff need to carry out their own field inspections to make sure that a) the M&E Field Support Form is being filled out correctly and b) that the data and information on all M&E Field Support Forms corresponds to what is in fact happening in the on-farm demo plots.

3.4. CERTIFICATES

It is common practice in the development industry to hand out diplomas or certificates at the end of a technical training. WN will only award certificates to those field staff, Lead Farmers, and farmers who have successfully completed each key practice. Points will be tallied based on field visits and data collected from the field support forms. The form listed below will be tallied up to determine a Lead Farmer or Farmer's score and whether that participant merits a certificate or not.

Certificate Points Form

Section A – Bio-Data	
Farmer Name	Village/District
CF Hoe or Animal Draft	On-Farm Plot Size
Section B – Correct Site Selection	
Key Activity	Points
Land Type (flat – no rocks, trees etc.)	1
Soil Type Test Done – soil is balanced.	1
Hard Pan Test Done – no hard pan exists.	1
Measuring Rope – correctly measured and used	2
Total Maximum Points	5
Section C – Land Preparation	
Activity	Points
Teran Rope Correct measured and used.	1
Residues on field	1
Rows properly measured/marked	1
Hoe – Basins Correctly dug.	1

Animals – Furrows Correct dug.	1
Total Maximum Points	5
Section D – Compost and Fertilizer Application	
Activity	Points
Compost Rates Correct	2.5
Fertilizer Rates Correct	2.5
Total Maximum Points	5
Section E – Planting	
Activity	Points
Correct Rates	1
Correct Spacing	1
Correct Depth	1
Planted – First Heavy Rains	2
Total Maximum Points	5
Section F Weeding	
One point per weeding – 5 weeding – clean field.	5
Total Maximum Points	5
Section G – Final Yield Results	
Yield Result is correctly measured	1
Final Yield is 25-30% higher in CF Plot than PP Plot	4
Total Maximum Points	5
TOTAL POINTS	*30*

This form should be attached to the M&E Field Support Form. Field Staff need to check the M&E Field Support Form with actual on-farm activities and situations to ensure that the Lead Farmer is correctly reporting the actual on-the-ground situation in each plot he or she is responsible for.

The following scoring table will determine if a farmer or Lead Farmer receives a certificate or not:

Certificate Scoring Table

Point Total	Action
15 points or less	Farmer/Lead Farmer is Dropped
16-20	No Certificate is Awarded
21-25	Certificate is Awarded
26-30 Points	Farmer Receives a Distinction

3.5. TECHNICAL TRAINING AND WORK PLAN

The following cropping and activity timetable will guide all key field activities and CF practices during this expansion phase.

Month	**January**				**February**				**March**				**April**			
Key Activity	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
Technical Training – Field Staff/Partners/Farmers.																
ID/ technical work with blacksmiths.																
Field Staff start site identification/selection.																
Field Staff explain activity to targeted villages.																
Farmers & Lead Farmers are chosen.																
Technical training Planning with farmers/Lead Farmers.																
Production and cost plans – manufacturers – contracts signed.																
Manufacture/Sale – CF equipment – 100 Rippers.																
Inputs organized & purchased.																
Compost Making																
Technical Training (1) – Site Selection/Measuring.																
Technical Training (2) – Residue Cover.																
Technical training (3) – Hoe and Animal Land Prep.																
CF Hoe and Animal Land Preparation.																
Technical Training (4) – manure /fertilizer.																
Field M&E and Support																
Month	May				June				July				August			
Key Activity	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
Farmers/Lead Farmers apply manure/fertilizer.																
Technical Training (5) – planting.																

Farmers/Lead Farmers Plant.																
Field M&E and Support.																
Farmers weeding activities.																
Urea Application																
Month	September				October				November				December			
Field M&E – Crop.																
Harvest Estimates																
Final Results - Certificates																
Exchange visits																

3.6. KEY NOTES ON ANIMAL DRAFT - ATTENTION!

This expansion phase will represent an opportunity for WN to experiment with CF Animal Draft using donkeys and horses. CF Animal Draft in Zambia and Mozambique has focused with using cattle draft to rip furrow lines during the post-harvest period. During the two weeks of technical training, both the donkeys and the horses performed well. While furrow lines did not achieve a depth of 15-20cm during the first pass with the Magoye Ripper, this is most likely due to the following reasons:

Soil conditions – The soil that was being ripped is very dry and quite hard at the moment. Levels of dryness and hardness will increase as the post-harvest season progresses. It is unlikely with soil conditions as they are that ripping depths will reach the required 15-20cm depth on the first pass. In Zambia during the first year of Oxen Draft Ripping most farmers found it difficult to achieve the required 15-20cm ripping depth. In Zambia, many farmers ripped during the dry season just prior to the rains in order to establish the furrow lines. They then make a second pass immediately after the first rain showers. The established furrow lines act as water traps and the oxen are then able to rip to the required 15-20cm depth. Framers then quickly apply their manure and fertilizer into their established furrows and are ready to plant with the first heavy planting rains.

Cord lengths – Existing cord lengths on donkey and horse harnesses – around 2m+ are most likely too short and need to be lengthened to closer to 3.5m. This will help the animals achieve deeper furrows. Farmers and Lead Farmers will need to experiment with cord lengths over the next 3-5 months.

Wheel and Hitch adjustments – In addition to experimenting with varying cord lengths, farmers will also in the upcoming land preparation period, need to make adjustments to hitch and wheel angles and depths. Getting the right adjustments with wheels and hitches will be an on-going process and the right angles and wheel depths will vary.

Yokes – Current oxen yokes are not applicable and need to be redone if oxen are to correctly and effectively create the CF ripping lines required. If a pair of donkeys is used, appropriate yokes will also be required. A yoke schematic diagram with the correct measurements required for current row spacing is located in Annex B at the end of this report. This schematic will enable local manufacturers and farmers create the yokes that they will need to correctly rip with oxen pairs.

After decades of using plowing equipment it will also take some time for both farmers and animals to adopt and get used to using the new equipment. This again, is an on-going process that will extend beyond the expansion phase.

It seems that there are high expectations concerning the capacity of CF Ripping equipment. Caution needs to be expressed – equipment made from local manufacturers needs to be fully field tested for strength and durability. Local blacksmiths might not be able to get the tine strength correct and other sources might need to be explored. It is imperative that participating local blacksmiths participate in field tests with the ripping equipment that they have produced. This will allow them to see for themselves what is required of the equipment and where weaknesses exist and need to be improved upon prior to manufacturing larger numbers of equipment.

3.7. KEY NOTES ON HOE CF – ATTENTION!

It has been decided and highly recommended that WN increase the number of farmers setting up and managing CF Hoe on-farm plots increase from 1-2 farmers to 2-4. While CF animal draft might at first glance be more appealing to farmers and staff due to the perceived ease with which CF Animal Draft can be implemented, it is the CF Hoe techniques that are far easier in many ways to implement and with which farmers tend to realize far higher yields with.

For CF Hoe, a farmer needs a hoe and a rope – fairly straightforward tools that are readily available in most places. Animals are not needed, angles and lengths on chains, hitches and the ripping equipment do not need to be calibrated, adjusted or experimented with. If a hoe breaks, it is far easier to source another one. The CF Hoe basins can be dug once and there is no need for second passes as will be the case (at least in the first season) with CF Animal Draft power. Hoes can easily be replicated by local blacksmiths; the project still needs to ascertain if local blacksmiths can indeed replicate the Magoye Ripper to a standard required.

CF Hoe basins as many Zambian farmers will attest are more precise in the outlay of inputs. This leads to higher yields – in some cases double what a CF Animal Draft Farmer will realize. Each hole receives 10-12g of fertilizer, and in the case of maize, three seeds. Evenly spreading, fertilizer and or compost along a ripped furrow line are for the most part an inexact activity. There will be segments along the ripped furrow line where there are more or less than the required amount of fertilizer, compost and seeds. The exact size and form of the CF Hoe basin largely eliminates this inefficiency. Many Zambian farmers, even if they have animal draft will tend to opt for digging CF basins with a hoe due to its more exact nature and the higher ensuing yields.

During the second technical training, some Field Facilitators felt that only animal draft was used in their villages – this could very well be the case. However, as a project, field staff needs to give farmers options and that means training them in both CF Hoe and CF Animal Draft. It is not up to staff or anyone else for that matter to determine which system might be better, easier to "sell" to farmers or one that would be "better" for them. For farmers to be able to make that judgment for themselves, it will be imperative that at least 2-4 (ideally more if possible) CF Hoe on-farm plots are set up – even in areas where farmers traditionally use animal draft.

3.8. KEY NOTES ON CF EQUIPMENT MANUFACTURING – ATTENTION!

During the technical training with the 6 local blacksmiths it was suggested several times that the Magoye Ripper needs to be modified. I would strongly caution against making any immediate modifications to the Magoye Ripper until second ripping passes have been done after the first rains later in May or June. The Magoye Ripper seems to be performing as well as it can in light of the length of cords being used and most importantly with the current dry hard soils that we have been ripping on since the start of technical training. It will be far easier to tell if modifications need to be made after cords have been lengthened, wheels and hitches adjusted and softer soils are ripped.

Furthermore, it is far easier and less expensive adjusted wheels, hitches and cords than it is making modifications to the actual Magoye Ripper. These should be the first steps taken when trying to get to ripping depths of 15-20cm. If ripping depths are still not at the 15-20cm depth after the second ripping passes have been completed and after all other necessary adjustments have been made to the other equipment then modifications to the Magoye Ripper can be explored.

3.8.1. MANUFACTURING PRODUCTION PLANS

In addition to the CF equipment field and strength tests that were carried out in conjunction with the 6 blacksmiths production plans and targets were also established with the 6 local blacksmiths. The table below represents the individual targets and contact details for each local blacksmith.

Enterprise	Lieu	Directeur	Magoye Rippers	Chaka Hoes
UAP (unité d'apprentissage et de production)	Kédougou	Bocar Ba +221 77 146 9186	17	60
Suxali Mbeye mi	Koumpentoum	Moustapha Gueye +221 70 105 77 09	17	60
Noé Ndao	Koussanar	Diougal Mboup +221 77 326 4050	17	60
Mané Mankané	Koussanar	Maadou Mankené +221 77 204 4987	17	60
Thiam et frères	Tamba	Modou Thiam +221 77 575 7660	17	60
	Tamba	Chiek Fallou Diong +221 77 568 0865	17	60
Totals			102	360

Each Magoye Ripper will come complete with hitch assembly and the main frame. Farmers will have to source two wrenches and the 3,5m Trek Chain. Each Shaka Hoe kit will consist of the hoe blade and the handle.

3.8.2. PRODUCTION SCHEDULE

It is envisioned that actual in-house production will start around the 28th, January 2010 and will finish in around 39 days. The priority equipment will be the Magoye Rippers, since farmers already have hoes and can use what they own to start their CF planting basins and later switch to a Shaka Hoe when they are available. Stock will be rolled out into the field on an on-going basis with all stock expected to be produced and in-field by around the 7th of March 2010. Production of the Magoye Rippers will be completed around February 13th, 2010.

Key Activity	January				February				March			
Contracts signed – WN & 6 Blacksmiths.												
Work commences – MR & Shaka Hoes.												
Production – MR & SH.												
Production – SH.												

** Orange box = Magoye Ripper production completion. Yellow box = Shaka Hoe production completion.*

3.9. FARMER AND LEAD FARMER SELECTION – "NOTRE AMI – C'EST LE RESULTAT" - LG

Good results will come from good serious farmers and Lead Farmers. It will be highly critical that careful farmer and Lead Farmer selection be done prior to starting technical training and plot set ups. Farmers and Lead Farmers who are poorly selected will obviously do a less than stellar job resulting in less than desirable results. Farmers and Lead Farmers not willing to invest the time and money involved in training and equipment purchase should not take part in this expansion phase.

Farmers who do not follow the key practices as recommended and taught during the five technical sessions should be immediately dropped and either replaced if there is still time to work with a replacement or not. It is better to have five well done on-farm and demo training plots than 15 poorly done plots. All participating farmers should sign contracts between themselves and the project clearly stipulating their roles and responsibilities. An example of a CF Farmer to Project contract that is being used in Kenya is found in ***Annex A*** at the end of this report.

3.9.1. PRODUCTION COSTS

The following table outlines per unit production costs by manufacturer.

Entreprises	Couts de production (FCFA)	
	Magoye Ripper	Chaka Houe
Chiek Fallou Diong	27,500	8,000
Thiam et frères	25,000	7,500
GIE Suxali Mbeye	46,200	12,500
Noé Ndao	55,600	15,000
Mané Mankané	47,000	15,000
UAP	58,800	7,320

During a detailed material and labor costing exercise, manufacturers feel they could probably market the Chaka Hoe eventually at 7,500FCFA and the Magoye ripper between 25-35,000FCFA.

4. RESULT TWO: CF HOE AND OXEN TECHNICAL MANUALS WOULD HAVE BEEN DEVELOPED IN FRENCH.

4.1. FIELD OFFICER AND LEAD FARMER CF TECHNICAL TRAINING GUIDE

Three manuals have been translated from English into French. The first one is a Field Facilitator Guide that gives the Field Facilitator technical outlines and ideas for activities and training techniques needed to carry out CF Hoe technical training for farmers and Lead Farmers. With the exception of the technical session related to hoe land preparation, the remaining sessions in this guidebook are also applicable to animal draft training.

4.2. OX CF GUIDEBOOK – ZAMBIAN CFU

The second guidebook is the Zambian CFU Oxen Guide. This guidebook is not meant to be a permanent training resource for WN. This is mainly due to its very Zambian specific nature and the fact that it focuses solely on Oxen Draft power and not horses or donkeys. It does however give an excellent overview of using animals and what is required and how to effectively use the CF ripping equipment with animal draft power. WN will eventually be able to create their own CF animal draft manual that is Senegal specific and has the necessary sections related to CF Land Preparation using donkeys and horse draft power.

4.3. MAGOYE RIPPER – A GUIDE

The third manual translated is the Zambian Golden Valley Research Trust (GART) guide to using the Magoye Ripper. This manual is a useful user guide to effectively using both the Magoye Ripper and the plow beams, hitches and wheels – all required to effectively carry out dry season land preparation.

5. RESULT THREE: BUSINESS DELIVERY SERVICE MANUAL WOULD HAVE BEEN DEVELOPED IN FRENCH.

A Business Delivery Manual for Tillage Service Providers has been translated from English into French. This covers the very basic commercial delivery services that an in-community service provider must know how to do in order to run and manage a successful commercial service delivery operation. This guide is based on the same one that has been used to good effect in both Zambia and Mozambique. BDS should come after farmers and potential in-community service providers have started to try out and integrate the CF Animal Draft practices into their on-farm demo plots. This will accomplish the key platforms that will be critical if service delivery operations are to develop:

a. Demonstrate the higher yields that can arise using CF Animal Draft; this in turn will

b. Increase, the number of farmers willing to adopt the practices and who, due to actual and potential benefits, would like to source a CF Animal Draft tillage service; and

c. Increase via two principal avenues, the number of in-community services providers interested in buying the equipment and willing to incur equipment costs and offer timely and professional CF Animal Draft services.

If the expansion phase goes well, it is likely that in-community service providers will come from existing plowing service providers and from expansion phase CF farmers interested in and seeing the commercial viability of offering this type of service provision.

In order to demonstrate the potential benefits of first the technology, farmer indentified in-community service providers need to be invited to the technical training sessions and plot set ups that will occur over the next 4-6 months under the expansion phase. This will give them an excellent idea as to what would be required on their part, should they be interested in selling this type of service after that expansion phase has ended. There will now exist, actual hard on-the-ground results along with a larger and even potentially larger commercial platform of farmers interested in integrating the practices into their own on-farm operations. At this stage, a number of capable local blacksmiths would also have the manufacturing and technical capability to manufacture and sell the necessary high quality and durable equipment needed by a service provider.

It has been amply demonstrated in Zambia and Kenya that in-community service providers using commercially based platforms can act as drivers and adoption of the CF technologies to farmers who cannot afford to purchase the equipment and animals required, but who can and are willing to pay for a service that they see the value in. If the expansion phase goes well, and after the 6 local blacksmiths market and field test their CF equipment with participating farmers, then BDS technical training late 2010 or early 2011 needs to be organized and carried out with those interested and farmer selected in-community service providers.

6. RESULT FOUR: A STRATEGY TO PROMOTE CF THROUGH SERVICE PROVIDERS IS PROPOSED.

It has been proposed and agreed to during this technical consultancy that the primary and most important strategy, upon which future service and manufacturing provision rests,is the success of the upcoming expansion phase – the success of which in turn depends wholly on the correct set up and proper management of training demo and on-farm plots. If that is satisfactorily accomplished, yields on those CF Hoe and Animal Draft plots will most likely be at least 20-35% (in some cases up to 40-50% higher) higher than yields on corresponding traditional plots. This will quickly set the stage for local manufacturers and blacksmiths to develop plans in conjunction with WN staff to enter into the manufacturing and sale of CF equipment.

A successful expansion phase will also create a base of farmers eager to integrate and adopt CF Animal Draft power into their current farming operations. This base will become a natural commercial platform for in-community service providers to provide timely and professional CF Animal Draft power services.

The following timetable will guide manufacturing and in-community service provision activities during the expansion phase and after the successful completion of the coming expansion phase.

Key Activity	**Months February 2010 – January 2011**				
	Feb.-Sept.	**Oct.**	**Nov.**	**Dec.**	**Jan.**
Expansion Set UP/CF Plots-Evaluation (see detailed work plan in ***section 2.2 – Technical Training and Work Plan)***					
Blacksmiths manufacture 100 Magoye Rippers and 360 Chaka Hoes. Manufacturing plans & unit costings established					
Indentified and interested In-Community Service Providers attend all technical training sessions.					
100 Magoye Rippers are field and market tested by blacksmiths and farmers/Lead Farmers.					
In-Community Service Providers are identified by farmers for 2010-2011 Ripping Season.					
Blacksmiths linked with In-Community Service Providers & Farmers for order placement.					
Blacksmiths start manufacturing farmer and Service Provider equipment orders.					
In-Community Service Providers start BDS and CF Animal Draft Technical Training.					

Start of market and field testing of CF equipment during the upcoming expansion phase.

Once trained, new In-Community Service providers will then be ready to commence commercial ripping services to their clients.

7. RESULT FIVE: IN ORDER TO CONVINCE FARMERS TO INVEST IN CF, A DOCUMENTARY FILM OR SLIDE SHOW WILL BE PREPARED AS COMMUNICATION SUPPORT TO EXPLAIN THE TECHNICAL PROCEDURES, THE USE OF THE TOOLS AND COMPARE THE PERFORMANCES FOR BOTH MANUAL AND OX FARMING SYSTEMS.

This result was started during the July pilot phase and will be an on-going activity as the project records the results of the season. Filming, interviewing and photo compilation was done throughout the first week of CF Hoe and Animal Draft training.

ANNEX A

The following contracts for Project – Lead Farmers have been developed in Kenya and can be used as a basis for the same type of contract between WN and the Lead Farmers who will manage the training and demo training activities.

(Example Contract)

Conservation Farming Pilot Project Kenya (CFPP)

And

CF Farmer/Lead Farmer

This contract outlines the roles and responsibilities that each farmer and Lead Farmer must effectively and correctly manage and carry out. Failure to carry out any of these roles and responsibilities on the part of the farmer or Lead Farmer will result in the project immediately terminating any and all future technical support.

As a participating farmer and Lead Farmer your primary functions will entail the following, but will not be wholly restricted as future field operational needs arise during the course of the CF expansion:

1. Able and ready to devote a portion of his/her land to a CF (animal draft or hoe) plot. An equivalent sized parcel will be prepared and managed by the farmer and Lead Farmer using current conventional practices. The farmer or Lead Farmer will not deviate from either of the following during pilot plot demo set up and management:

    a. Application of all CF recommendations on the CF plot; and

    b. Application of current conventional practices in the conventional plot.

Failure to adhere to these two conditions pertaining to demo plot set up and management of the CF demo plot during the expansion phase of the project will result in the immediate termination of technical support to the CF farmer and or Lead Farmer.

1. Willing to attend all technical training and expansion pilot related meetings as scheduled by the project. This will include, but not be limited to the following:

    a. Overview of the goals of the WN CF expansion phase and activities including non-negotiable CF Hoe and Animal Draft Practices and demo plot and on-farm plot set ups.

    b. Selection criteria of farmers and Lead Farmers.

    c. All technical training on related to the five principal activities related to the CF expansion phase – correct land selection, measuring, residue cover retention, hoe and animal draft land preparation, manure/fertilizer application and planting.

    d. All subsequent M&E meetings as deemed essential during demo plot design and set up.

    e. For family run farmers – both husband and wife must attend all scheduled technical training and follow up meetings.

    f. Top dressing (Urea) technical training for Maize crop.

g. Pre-harvest technical training.

h. End of season in-field pilot assessment.

2. Must follow all recommended CF Hoe and Animal Draft practices on the CF demo and on-farm plots.

3. Must keep accurate and timely records on the M&E data sheet provided by the project which will include but not be limited by the information listed directly below this line:

   a. Plot Size per farmer.

   b. Land preparation cost and time.

   c. Fertilizer rates +dates + time fertilizer/manure were applied.

   d. Planting rates + dates + time crop was planted.

   e. Number of weeding activities that were carried out and when.

   f. Accurate and timely measure of final demo plot yields.

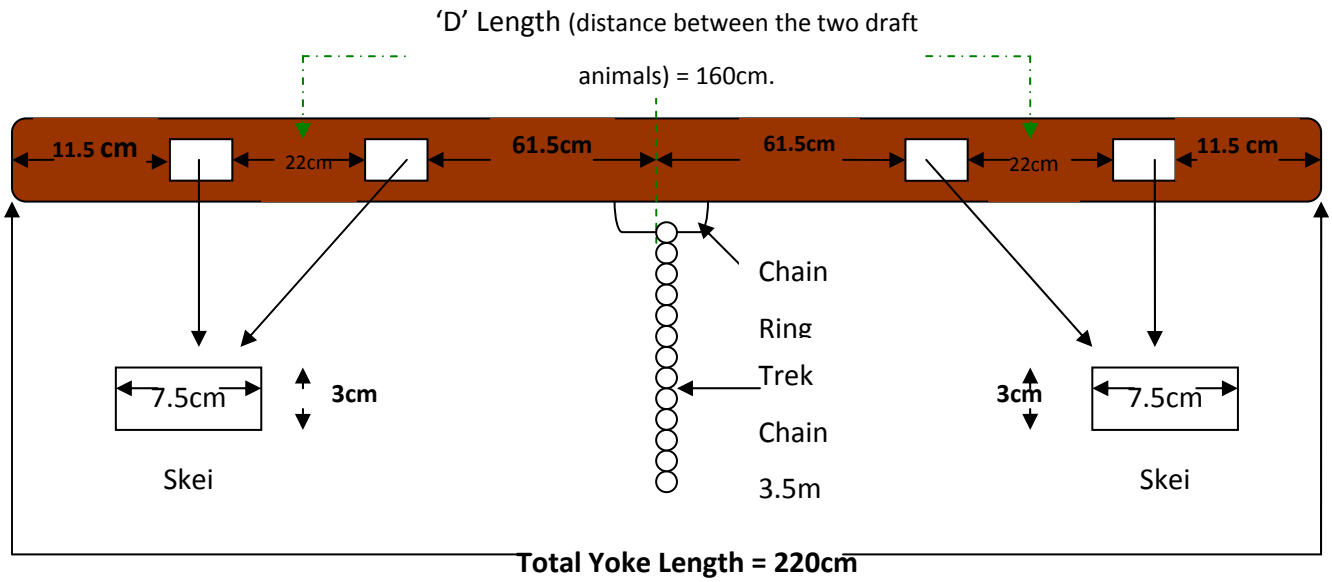
4. **There are no exceptions to non-application of cf hoe or animal draft recommended practices during the expansion phase of the project. Failure to apply recommended cf hoe or animal draft practices on the part of the cf farmer and or lead farmer and where applicable his or her spouse will result in the immediate termination of any and all technical support by the project to the cf farmer and or lead farmer.**

It is the sole responsibility of the CF farmer and or Lead Farmer to promptly bring to attention to project staff any issues, problems, obstacles and questions arising from any and all project CF technical support and interventions. Failure to do in a timely manner will result in the immediate termination of all and any technical support to the farmer and or Lead Farmer. Furthermore, it is the full and sole responsibility of the CF farmer and Lead Farmer signing this contract that he or she understands the roles and condition as stipulated in this contract. Failure to quickly clarify on the part of the CF farmer and or Lead Farmer any and all questions related to the workings of this contract will result in the project immediately terminating any and all technical support by the project to the expansion CF famer and or Lead Farmer.

By signing this contract, I state that I fully understand all my roles and the contractual obligations and conditions required of me as outlined in this contract.

ANNEX B

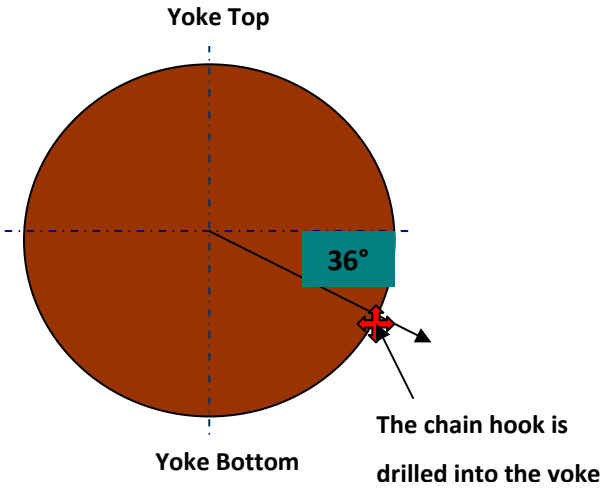
CF Ripping Yoke Measurements
For Row Space = 80cm
(Top View)



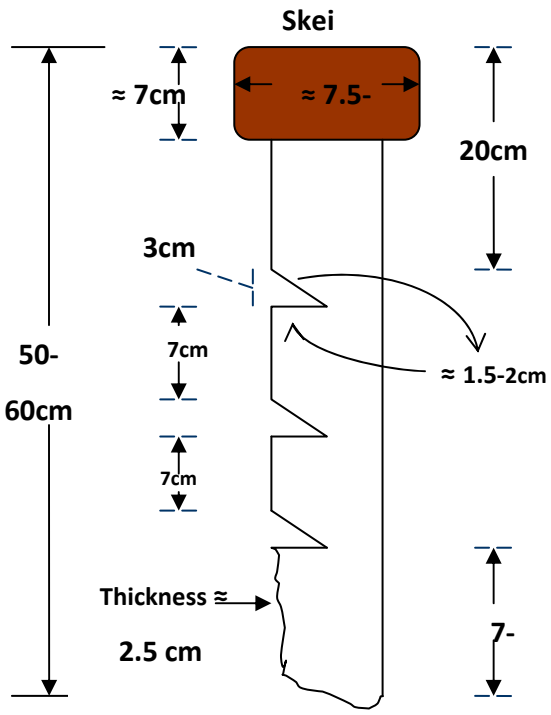
Note – if row spacing is 80cm then 'D' Length = 160cm. If row spacing is 75cm then 'D' length = 150cm. All other measurements remain the same.

(Skei and Diameter View)

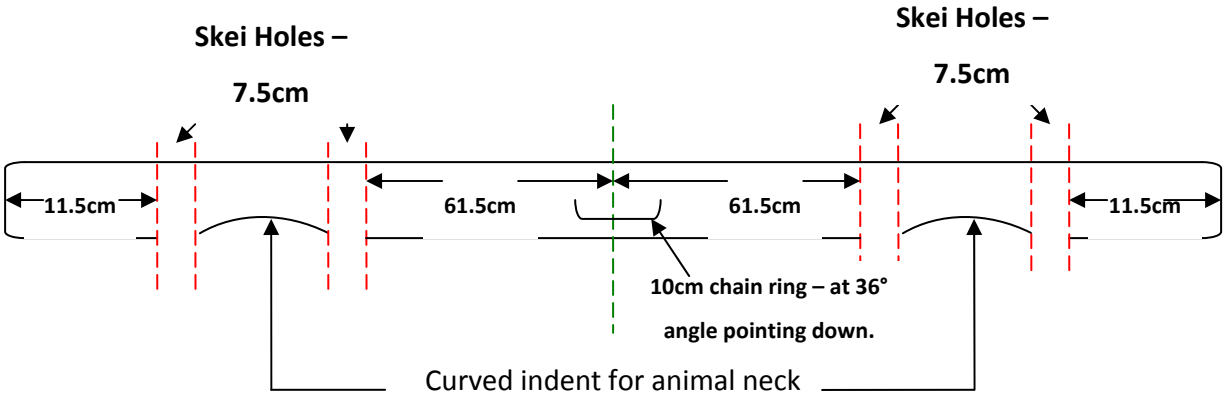
Diameter View with chain hook



Diameter = 8-10cm



(Side View)



Curved indent for animal neck

centre – 22cm length and angled to

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