

FSAU REPORTS AND ACTIVITIES

** FSAU has contracted a software firm to assist in the construction of a data dictionary – a description showing metadata and entity relationships of all technical data in the Unit (including nutrition data). Work has begun and FSAU will be requesting some of its partners to assist by meeting with the software firm and discussing both the types of data and information shared with FSAU as well as the data that they *would like* to share with the Unit. For more information, contact Charles Rethman, Head of Information at charles@fsau.or.ke.

** FSAU Situation Analysis on pastoralists in Galgaduud region – currently experiencing a particularly harsh *Jilaal*. This information follows field work conducted by a team of FSAU staff during February/March 2003. Situation analysis and possible responses are discussed. Please contact alex.williams@fsau.or.ke for the report.

Food Aid Distribution

CARE have almost completed their re-registration of former food aid beneficiaries in northern Gedo which currently amounts to about 58% of the beneficiaries they had previously registered in this region. In March CARE distributed approximately 410 MT of general food aid in El Waq district, Gedo region. They plan to start food distribution in Luuq district, Gedo, on the 7th of April, and move on to Dolow and eventually to Belet Hawa districts. Under Food for Work, CARE dispatched about 500 MT to Mogadishu for distribution in Bay, Bakol and Hiran regions. In Tieglo district in Bakol region 120 MT were distributed. In Middle Shabelle, 100 MT were distributed in Aden Yabal district. In Hiran, 60 MT were distributed in Jalalaqsi, 120 MT in Belet Weyne, 50 MT in Mahas and 50 MT in Mataban.

WFP distributed approx. 66 MT in Bay region of which 26 MT was distributed in Baidoa district. In Bakol region 241 MT of food was distributed. In Lower Shabelle region 116 MT were distributed – a significant increase compared to February. In Hiran region 50 MT were distributed, 36 MT were distributed in Awdal, 196 MT in Galbeed, 66 MT in Togdheer, 31 MT in Bari, 3 MT in Nugal, 3 MT in Sool and 4 MT in Mudug regions. In summary, 473 MT were distributed in the South, 298 MT were distributed in the North west and 40 MT in the North east.

For further information on CARE's food aid operations, please contact : narayan@care.or.ke. For further information about WFP's activities, please contact : Lubna.alaman@wfp.org.

HIGHLIGHTS

- Rainfall in Shinile, Ethiopia : WFP in Ethiopia have reported rains in Shinile (the area adjacent to Awdal and Djibouti). Recent immigrants from Shinile into the Guban of Awdal are aware of this rainfall but FSAU reports that the immigrants have not started returning home because their animals are still weak, the rains are thought to be insufficient and pasture in Shinile has not yet regenerated. See the Regional Summary for North-West and Awdal on page 3.
- Shabelle River level dangerously low : The reason for this is unclear but FSAU is investigating what may be causing this. The Shabelle riverbed is almost dry and the remaining water in the river is dirty. This is not common for the time of year and cases of cholera have been reported in Mogadishu, along with reports of increased water-related diseases along the river. Farmers were less able to use gravity irrigation during the 2002/03 *Deyr* growing season in the Shabelle Valley and there is concern about the water availability for irrigation during the coming *Gu* season.
- Fuel Prices Rise : Fuel prices have risen sharply in all markets along the two main rivers of Somalia. (Juba and Shabelle) This will have implications for agricultural production as input costs are related to the fuel price, especially when river levels are low. See page 2.
- Climate Outlook Forum : The 11th Climate Outlook Forum met at Entebbe between 3-5 March 2003, to forecast rains in the March to May season throughout the Greater Horn of Africa. The Forum forecasted that a 'near-normal' rainy season has the highest probability throughout Somalia, with a slightly higher probability of 'above-normal' rainfall in central and southern coastal parts, and a higher probability of 'below-normal' rainfall in the North-west (Somaliland), Northeast (Bari) and southern inland regions (Gedo, Bay, Bakol and Hiran) See page 2.

Highlights from the FSAU 'Nutrition Update'

Preliminary results of the nutrition survey undertaken in early February in *Hargeisa* indicate a disappointing lack of improvement in malnutrition rates among children under 5 years in the returnee/resettlement/IDP areas in Hargeisa since the previous survey in June 2001. Global acute malnutrition rates now reach 15.3% (Weight for Height <2 Z-scores or oedema) including 3.8% severe malnutrition (W/H <3 Z-scores or oedema). Assessment of mortality was also undertaken and the rate appears to be high – data is undergoing further analysis. Low income, reduced access to water and essential services along with unsanitary living conditions are some of the factors leading to the continuing high malnutrition rates.

Rapid nutrition assessments in *Gedo*, where significant numbers of households in all food economy groups are failing to acquire adequate food, confirm that food

Insecurity continues to be a significant cause of continuing high levels of malnutrition. In late February, using measurement of Mid Upper Arm Circumference as an indicator, less than half the children in Garbaharey, Dolow and Burdhubo were well nourished. Few interventions are in place in Gedo that effectively address the longer-term causes of food insecurity.

The March *Nutrition Update* continues to highlight continuing high numbers of children in *Mogadishu* receiving treatment for severe acute malnutrition.

The April *Nutrition Update* will provide the results of recent rapid nutrition assessments in *Kismayo* and Hiran, in addition to more detailed analysis of interventions in *Hiran*.

For copies of nutrition survey reports and further information related to nutrition, see the FSAU monthly publication 'Nutrition Update' or contact : noreen.prendiville@fsau.or.ke

HIGHER COST OF IMPORTED COMMODITIES, INCLUDING FUEL, LINKED TO TENSIONS IN THE PERSIAN GULF

Normally in the *Jilaal* season, local cereal and milk become more scarce and prices increase in markets throughout Somalia. In comparison, prices of imported commodities, especially sugar, rice and fuel usually remain stable or even decrease slightly.

It is usually during the *Gu* rainy season (April-July), that prices of imported commodities increase moderately and then during the high tide season (June-August) increase sharply. Nonetheless, this *Jilaal* season, the prices of imported commodities have increased earlier than expected. This price increase is attributed to uncertainty surrounding the war in Iraq because imported commodities are mostly traded through the Persian Gulf countries. Figures 1, 2 and 3 in the far column on the right show the price trends for imported sugar, fuel and US dollars in three main markets on the two rivers: Mogadishu, Belet Weyne and Bardera, for the last two years (March 2001-March 2003).

Comparing fuel prices across different markets, Bardera has the highest prices

due to the high transportation costs from Mogadishu. Fuel prices are lower in Mogadishu and Belet Weyne. A similar trend is also observed for sugar. However, the Somali shilling/US dollar exchange rate shows the same trends in all three markets because the banking system does not require the costly physical transfer of funds from location to location, allowing the foreign exchange markets to be closely integrated.

Reports from the field indicate a lack of fuel in most markets, causing an increase in prices of other commodities as well as a reduction in cash cropping, attributed to the lack of fuel or the expensive price of fuel for pump irrigation. Farmers are concerned about the *Gu* rain forecast, especially in the irrigated areas, due to currently low river levels. Fuel price rises also worry urban dwellers, which rely on fuel purchases for their livelihoods. Over the last three months, fuel prices in Bardera have jumped from Ssh 9,900 per litre in December 2002 to Ssh 11,500 in March 2003, an increase of approximately 16 per cent.

BELET WEYNE : GOOD FOOD SECURITY INDICATORS AND SUPPLEMENTARY FEEDING PROGRAMME (SFP) NUMBERS INCREASING - WHY?

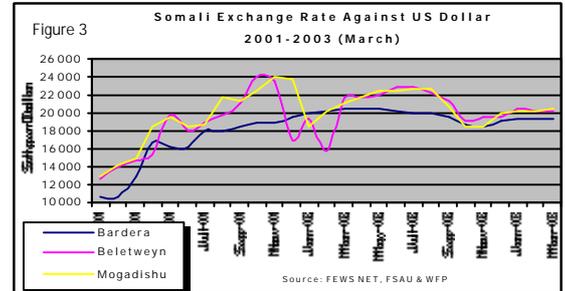
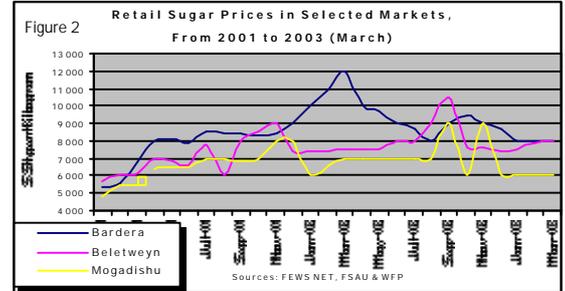
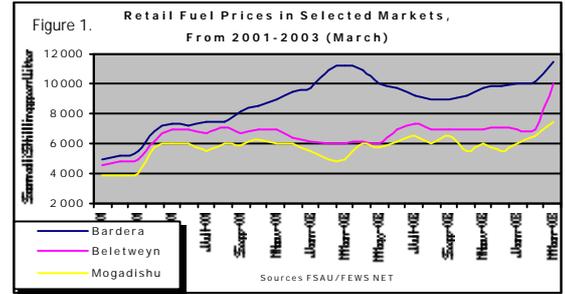
A nutrition survey in May 2002 (following failed *Gu* rains) found 21% of children malnourished (significantly associated with morbidity), poor sanitation and dependence on hand-dug wells and the river for drinking water.

The SFP started in January 2003, after the *Deyr* harvest. The programme gives a supplementary ration to children and a household ration.

Beneficiary numbers have been steadily increasing with most reportedly from labouring households. This seems to contrast with food security indicators – increased labouring opportunities, good terms of trade, plentiful *Deyr* stocks. FSAU's rapid MUAC assessment (March

2003) showed no increase in malnutrition prevalence. The increase in SFP numbers could therefore be increased child morbidity (nutritional insecurity) coupled with greater awareness of the SFP. Morbidity and access to water are considerably worse during the survey as water sources have dried up.

NB: There is deep concern about the coming *Gu*. Even if rains are timely the high fuel price, low grain price and increase in fuel requirements might prove disastrous for farmers, discouraging production. Agencies are warning against food relief. Water, sanitation and health seem to be critical factors for malnutrition.



LIVESTOCK EXPORT TABLE MARCH 2003

Bosasso *	December	January	February	March
Camels	1,300	50	650	N/A
Cattle	3,773	5,820	3,236	N/A
Shoats	100,154	209,030	118,070	N/A
Total	105,227	214,900	121,956	N/A
Berbera **				
Camel	450	2,947	2,156	2,173
Cattle	8,800	10,174	5,003	3,273
Shoats	40,396	123,089	61,046	22,655
Total	49,646	136,211	68,205	28,111

Source *: Bosasso Port Authority **: Berbera Port Authority

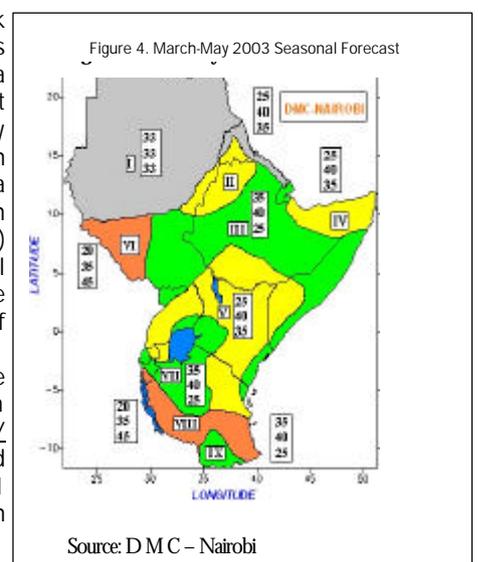
CLIMATE OUTLOOK FOR SOMALIA BETWEEN MARCH-MAY 2003

Between 3-5 March 2003, the eleventh Climate Outlook Forum was convened in Entebbe, Uganda by the Drought Monitoring Centre, Nairobi (DMCN). Its aim was to formulate a consensus on the March to May rainfall season in Greater Horn of Africa.

The seasonal forecast indicates an increased likelihood of near-normal rainfall over much of Greater Horn of Africa. The rainfall outlook is broken into zones, as indicated in Figure 4. Probabilities of near-normal to above-normal rainfall are higher in zones III, VII and IX. Zones, II, IV, and V are more likely to get near-normal to below-normal rainfall. The chances of below-normal rainfall are even higher in zones VI and VIII.

The period, March to May, constitutes an important rainfall season over the equatorial parts of the Great Horn of Africa. In Somalia, this period corresponds to the beginning of the critically important *Gu* (main) rainy season.

As seen in this map, the Climate Outlook Forum divides Somalia into three main zones (IV, III and V). The Forum forecasted that a 'near-normal' rainy season has the highest probability throughout Somalia, with a slightly higher probability of 'above-normal' rainfall in central and southern coastal parts, and a higher probability of 'below-normal' rainfall in the Northwest (Somaliland), Northeast (Bari) and southern inland regions (Gedo, Bay, Bakol and Hiran). FEWS-Net Somalia will provide additional information on the implications of the forecast on food security in those regions. MARS (Monitoring Agriculture with Remote Sensing), reported in their latest crop bulletin issued April 7 ([Ftp://mars.jrc.it/bulletin/somalia](http://mars.jrc.it/bulletin/somalia)) that large parts of Somalia had received some first *Gu* rains during [20-31 March] with peaks of more than 10 mm in Juba and Gedo Regions.



Source: DMC - Nairobi

REGIONAL FOOD SECURITY HIGHLIGHTS AS REPORTED BY FSAU FIELD MONITORS

Every month, the 22 FSAU Field Monitors provide in depth information on food security indicators in their areas. If you would like to obtain a copy of their district reports - please contact alex.williams@fsau.or.ke. The Regional highlights are a summary of this field information.

NORTH WEST & AWDAL

There has been some relief from the highlands ('Ogo') of Awdal and Galbeed regions stretching to the agro-pastoral areas of Gabiley and Borama, following what appears to be the commencement of the **Gu** rains. These areas received slight and sporadic showers, known locally as **Todob**, in mid March 2003. Most local migrants to the Guban (coastal/sub-coastal) area from Awdal and even from Hargeisa and Gabiley districts moved back to their permanent settlements. This has relieved some of the grazing pressure on the already exhausted pasture. Following a visit to the Guban of Awdal region, ADO (a local NGO in Somaliland) reported that the Issa-owned cattle from Ethiopia started calving but due to the poor pasture and increasing temperatures, the owners slaughtered the newly-born calves in order to save the mothers. This practice is common as calves born in the dry season as they have hardly have any chance of survival. Normally, the mating period for cattle is regulated so that calving occurs at the beginning of the rainy season in Shinile Zone (Ethiopia), but owing to the long migration into Somaliland, cows are calving in areas that are still dry, with extremely poor pasture.

The FSAU livestock Officer recently visited areas along the border with Shinile Zone (Harirad and its pastoral areas) and reported that **Gu** rains had been received in Shinile, Dembal, Aisha'a up to Dire-Dawa, an encouraging event. However, sporadic distribution (frequency) and intensity (volume) of rainfall has not been sufficient to regenerate enough fodder for cattle and sheep. Even so, the Issa immigrants to the Guban have not begun returning for three reasons:

1. The animals are still too weak to travel and recent calving will further delay their return.
2. There is insufficient fodder along the way for the long trek back home.
3. Rainfall and vegetative growth are insufficient back home, and there is uncertainty about the current rains and their intensity.

BARI REGION

The food security situation in the coastal FEZ is below normal due to devaluation of the Shilling against the US dollar making poorer households particularly vulnerable. However, the situation in Dharoor and Sool FEZ is normal though the depreciation of the shilling is likely to impact negatively on the poorer groups. There were some sporadic rains in the coastal and Sool FEZs and no rains in the Dharoor FEZ. Pasture is normal in most areas of the Bari region. Livestock prices have increased by about 10% for both local and export quality. This is good for the purchasing power of the pastoralists. Water access is normal in coastal and Sool FEZs but there are shortages in some areas of Dharoor FEZ such as Uur Aleed.

SANAG & TOGHDEER

The general food security situation of these two regions is normal to below normal; despite some areas being badly affected by the poor **Gu** and **Deyr** rains, widespread depletion of natural resources and serious water shortages, which have been reported in some areas of the Sool plateau. With exception of some villages in the Hawd and Sool plateau, water availability and accessibility for human and livestock is normal to below normal (given the time of year). Some water points have had been pressured by high livestock density beyond their capacity. In other parts the **berkads** are empty, and no available alternative water sources apart from expensive water trucking is possible. Abnormal livestock migration caused by water shortages has been more common in Sool plateau in eastern Sanaag and in the Hawd of Togdheer. Camel herds migrated to Region Five of Ethiopia in search of better pasture and water. The movement is more than normal in number, frequency and distance. There have been some sporadic rains in the **Xadeed** eco-zone and the prime grazing areas between Dagaar and God-Caanoob, west of Erigavo district also received these rains.

NORTH NUGAL & SOUTH BARI

March is the last month of the dry **Jilaal** season where livestock emaciation with 2 - 5% mortality rate is normal for the period. The food security situation is normal except in the lower Nugal areas adjacent to Sool region where rainfall has been below normal. There have been sporadic rains in late March in Hawd, Sool, Iyah, and Coastal/Deh FEZs of Garowe, Gardo, Dangoroyo, and Eil. The impact of the rains on pasture re-growth is being monitored. Some **berkeds** in Hawd have some water. Flash floods are also reported in some parts of Hawd/Addun FEZ. Nugal FEZ is experiencing some difficulties following rain failure in two consecutive years and pasture and grazing remain minimal. Close monitoring is required of both livestock and populations in the lower Nugal, Sool, and Sanag areas. Water is not yet a critical issue because of the availability of natural springs and shallow wells. The timely arrival of the **Gu** rains will improve the situation. Pasture in the Hawd, Sool and Iyah FEZ are poorer in comparison to the previous months. Water prices have almost doubled (in SSh.) when compared to the beginning of the season. Livestock prices (especially shoats) have increased by over 20% for both local and export quality. Sorghum prices have marginally dropped while rice has had no significant change. Terms of trade (shoats/cereals) have improved in favour of pastoralists in comparison to the previous month. Milk prices have increased by about 20% due to the limited supply. Lobster fishing season is tailing off and income from this activity is reducing.

SOUTH NUGAL & NORTH MUDUG

In the Hawd food economy, harsh **jilaal** weather has resulted in above-normal livestock migration from other food economy zones in south Nugal and eastern Addun, forcing native pastoralists to migrate to even more remote areas, far from **berkad** water points. This has resulted in increased water trucking from **berkads** to the pasture sites. As a result, the price of water has doubled compared to last month. The poor receive little support with water as it is expensive and this has put pressure on their staple-food expenditure. However, access to food is still normal for all wealth groups as milk and meat consumption has increased slightly following the early birth of shoats. Income for the households has generally improved due to increased demand for local quality shoats - they can be bartered for water. In the Addun food economy the **Jilaal** weather has caused most wealth groups apart from those in the extreme western parts to move to the water rich areas in eastern and southern parts. The water condition has normalized due to scanty rains in the coastal areas where most the people migrated to. However, poor infrastructure and the sheer remoteness of this area has resulted in high food prices which are above-normal. Furthermore, the lower middle and the poor are not able to access markets due to remoteness of the area and have no income from sales of livestock; making it more difficult for them to purchase food. Access to milk for the poor households has improved due to the newly kidded shoats, though this is not enough for sale. Compared to last month the situation has generally improved, however further improvement will depend on the **Gu** rains starting on time. If they do not, the poor from both food economies will be extremely vulnerable, especially those in the eastern parts of the Hawd Pastoral and extreme western parts of the Addun

SOOL (and the Buhoodle Hawd)

The Nugal Valley and Hawd Plateau FEZ's have a normal food security situation while the Sool plateau of Sool region is in an alarming condition due to pasture and water scarcity. This has led to very bad herd condition and high animal mortalities, particularly for camels, with attendant cessation of milk/meat production and lost marketability. Water trucking is underway. The price per drum went from Sshs. 10,000 to 40,000. Overall, there has been increased staple food purchase by families, while water remained the only other expenditure possible at the moment. Poor pastoralists and the lower stratum of the middle wealth group have limited access to enough daily food intakes, they are estimated altogether at 3,500 households. Terms of trade: The baseline for Nugal Valley was 1 shoaat (local quality) = 45 kg grain, while currently it is 139 kg. 1 litre of fresh camel milk was 1.6 kg, and currently 1 litre fetches 0.75 kg.

REGIONAL FOOD SECURITY HIGHLIGHTS AS REPORTED BY FSAU FIELD MONTIORS

JUBA VALLEY

The weather is hot and humid, showing signs of the **Gu** season beginning soon. Water access is poor inland, while southern part of Buale, pastoralists could not access deshek and river— **Jilaal** season grazing areas — due to insecurity hence moved to Afmadow and Sakow districts. Insecurity in Buale also disturbed livelihood sources for riverine food economy group. Moreover, no signs of land preparation activities for the **Gu** season is being observed in riverine villages especially south east of Buale which is abnormal at this time of the year. This may have a negative crop production implication during the **Gu** season. In the rest of the valley, the overall food security situation is normal. The availability of staple food in the markets is fairly good with normal prices. However, the price of imported commodities, remains high mainly due to the depreciation of the Somali Shilling and high transportation cost from Mogadishu. Livestock condition is good and prices increased slightly compared to last month, as seasonal demand is high in Garissa, Kenya. Unknown cattle disease was observed in Salagle and Nusdunia zone west of Sakow with direct food security implications for pastoral and agro-pastoral food economy groups.

HIRAN

The region had a good **Deyr** season crop and livestock production, and good income earning opportunities, hence there are good terms of trade and purchasing power for farmers. High **Jilaal** temperatures (as usual) have reduced pasture and water availability and poor body condition has diminished sales. Urban migration during **Jilaal** caused milk prices to increase. High demand for sorghum from central Somalia and reduced supply from Bay and this has maintained prices in town. Road security in Middle Shabelle has ensured continued maize supply into the region. Concern is being raised for the coming **Gu** because of the recent fuel price hike. This, together with increased water use for irrigation (the river level is abnormally low) will threaten **Gu** production even if rains are normal. Low availability of drinking water is contributing to infectious disease which could be a factor behind the reported increase in SFP beneficiaries. Investigations are needed to ascertain why the river level is so low and the causes of malnutrition in town.

GALGADUD

Conditions among the Haud pastoralists in NW Galgadud remain alarming. Animal production is poor and livestock mortality higher than normal. Terms of trade for marketable animals is good but many animals are in poor condition. The Haj temporarily increased livestock exports last month. Water prices are 50% higher than normal and poor pastoralists who cannot buy or "borrow" water have migrated to towns. 30% of camels have migrated into Ethiopia. ICRC has rehabilitated critical boreholes and berkads and reports better water access than last year. Reports of livestock morbidity include parasitic diseases, and possible goat pleura-pneumonia — which requires investigation. Late **Gu** rains will result in a critical situation with increased migration to permanent water sources and towns. There are early signs of rain, but the situation requires close monitoring. For a copy of the FSAU report on Galgadud contact alex.williams@fsau.or.ke

BAY

The ongoing **Jilaal** season has limited water availability for both livestock and human needs, placing stress on the catchments. Livestock tend to be located near farming areas and are using crop residues —this will change as farming activities increase and they move to the rangelands (farmers have begun preparing their fields). Pasture and grazing are normal (given the season) and milk production is still quite good, due to the good **Deyr**. Land preparation has provided renewed labour opportunities for the poor, while the self-employment/collection activities are also available. Currently, milk and livestock prices are high compared with that of staple, making terms of trade for livestock owners favourable. Labour/staple terms of trade are somewhat poor (10-12 kg per person-day, compared with 15 kg per person-day previously available) and with the higher cost of animal products (especially milk) and imported goods (due to shilling devaluation, rising fuel costs), food quality and nutritional status for the poor are affected.

LOWER SHABELLE

The usual dry weather (**Jilaal**) prevails in the region; water is scarce especially in northern parts of Qoryoley and north/eastern part of Brave district. River water is extremely low compared to normal. Most middle and better off wealth groups have enough cereal stocks at household level. Poor riverine households have been effected by conflict experiencing cereal shortfalls in Qoryoley and Kurtun waley districts. Agricultural employment activity is available—both harvesting of late planted sesame and land preparation for the **Gu** season. However farmers are worrying about the increase in fuel prices which might affect the ploughing operation. Livestock condition is good while pasture is scarce so animals are migrating to riverine areas where there are grazing opportunities in crop stocks, fallow fields and flood receded areas. The price of local maize has increased by 15 percent from last month due to the high transport cost and high demand in Mogadishu market.

MIDDLE SHABELLE

The region has experienced dry weather. Pasture and grazing conditions are below normal and most of the cattle have moved to riverine areas for water and grazing while sheep have moved to the coastal plains where shallow wells are available. Camel and goats are concentrated near boreholes. The sesame harvest is in its final stages. **Gu** land preparation is under way in both rainfed and irrigated areas. Maize and sorghum price have increased by 30 percent and 35 percent as compared to last month due to the low supply and high demand from other regions.

GEDO

This is the last month of the **Jilaal** season (known as **kal danbeed**) with extremely hot weather. Conditions are, however, better than March last year. Despite seasonal movements, livestock that did return are still within the region and water and pasture condition is normal (better in the south than in the north). This affects production and body condition. An endemic livestock disease (goats and cattle) was observed but VSF/EPAG provided drugs. Staple foods are available in the markets at normal prices. Poor households from all food economy zones in the north, with limited assets and income options, still have difficulty accessing enough food—hence malnutrition rates are expected to remain high. Prices of the imported commodities are high due to high transportation costs.

COWPEA BELT

The cowpea belt districts (Adenyabal, Adale, Elder, Galhareri, Hara-dhere and Hobyo) are experiencing the normal **Jilaal** season with declining staple food stocks, pasture, water as well as livestock products. Decrease in water availability has caused the price of water increase by 20% for a barrel of 200 litres during last month. The pasture and grazing are poor and livestock body condition is deteriorating, with livestock migrating in search of pasture and water. Due to the dry **Jilaal** season staple food stocks have been consumed and therefore have significantly reduced. A sustainable off-take of livestock has been sold as a normal coping strategy. The zones mainly affected by food shortages due to reduced food stocks are locations mainly in Adale and Warsheik. Dry land farming system action has begun.

BAKOL

Its been hot, dry and humid other than a few scattered showers in southern Hudur district, making little difference to water and pasture availability. Dry season water shortages are affecting all agro-pastoral groups and are particularly acute (affecting pastoralists as well) in the southeast and southwest of Hudur and in Rabbdhure districts. These are the farming areas of Rabbdhure and Hudur district that now have low cereal stocks following a poor **deyr**. Poorer households in these areas have been selling off their stocks and resorting to increased self-employment and other coping strategies—in order to afford minimum household needs. This will make food access difficult for these households during the planting season and the Food for Work projects in these are described as beneficial. Livestock condition is good (for the time of year) and market demand (reportedly from Yemen and Kenya) for shoats and cattle is high. Consequently, animals are fetching high prices and terms of trade for pastoralists are good. Milk production is lower than normal (affected by the reproduction rate) and although milk prices are high, overall income for pastoralists is lower. Milk is also therefore more inaccessible for the poor. There have been increased numbers of malnourished children reporting to Rabbdhure and Hudur health facilities, this is attributed to a high prevalence of water-borne disease as catchments dry up.