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Malted grain is subjected to size-reduction by semi-wet milling also by women using wooden pestle and mortar. Sun drying is the predominantly used method ranging from 1-3 hours depending on seasons. However, malting conditions that give an acceptable amount of free amino nitrogen (FAN) and α - and β -amylase has been reported and reviewed for sorghum (Novellie 1962; Okafor & Aniche 1980; Palmer et al. 1989; Dewar & Taylor 1999; Lyumugabe et al. 2012) and pearl millet (Pelembé et al.

2004) to be generally between 25-30°C and germination time between 1-3 days. Therefore, these conditions during malting for use in the brewing of beers can be adapted to malting sorghum/pearl millet for oshikundu brewing. The quality of traditionally made malt currently used in households needs to be studied and quantify the aspects such as its diastatic power, free amino nitrogen and related parameters important to the limited conversion process in the production of oshikundu. Recently, there is a dry premix of ingredients (pearl millet meal containing sorghum malt) produced industrially and is available in the supermarkets in Namibia. 4. Flow process for brewing Oshikundu There is little information on the brewing of this important drink in Namibia.

Few researchers have variously described the brewing method of oshikundu (Taylor 2004; Embashu et al. 2013; Hepute et al. 2016). The general flow process used in the making of oshikundu is shown in Figure 4.

The amount of ingredients differs between brewers and between households. The qualities of ingredients are generally not well studied or standardized. The processing conditions are also as diverse as the brewers.

The temperature of the pearl millet paste at which malt is added is variable. The current method of its estimation is generally done by placing a finger in the paste to feel how warm the paste is. The amount of ingredients, the temperature of water added, the consistency of oshikundu paste (pearl millet), time of dilution, duration of conversion by the malt is also some of the parameters that are not controlled and needs investigation for the improved brewing of this beverage. An alternative brewing method of oshikundu exists. The difference is noted at the mixing the dry ingredients (malt and pearl millet meal) before water addition. Furthermore, the water added is lukewarm instead of boiling water. It is hypothesised that the addition of lukewarm water to the meal containing the malt is aimed at not inactivating the enzymes present in the malt.

The extent of gelatinisation and conversion and effect of dilution during oshikundu brewing warrants assessment. The microflora responsible for fermentation and its potential health benefits also needs to be explored. Based on the review of current traditional brewing practices of oshikundu, for example ingredient ratio of pearl millet meal: sorghum/pearl millet malt: water and the mixing regime, extent of gelatinisation and conversion results in the separation of two layers (Figure 1), the upper watery layer and bottom layer with more dregs. When consumers take oshikundu, some gently shake it to mix the bottom layer with more dreg with the watery layer. Others may prefer to take the top watery layer. If unconsumed, left-over dreg goes to waste or becomes animal feed. The dreg which sediments at the bottom is mostly made up of pearl millet meal, which has a concentrated

macronutrients (mostly starch) and is thus concentrated energy is in the form of un-gelatinised starch from pearl millet meal.

This highlights the need to optimise the brewing process to reduce the amount of dregs in oshikundu especially for consumers who may not prefer consuming the suspended dregs. Following the current traditional brewing method, one can potentially intelligently adjust parameter to optimise the amount of dregs and still produce oshikundu that is also acceptable to consumers. The amount of ingredients per final volume, extend of gelatinisation of starch, malt quality, malt and pearl millet meal ratios, temperature at malt addition, consistency of oshikundu paste and time of dilution/duration of conversion by the malt, pasteurisation, filling/canning can be studied to contribute to the value-addition of this beverage. Based on the current household brewing practice, commonly using roughly pearl millet meal to malt in 200: 100 g respectively, Hepute et al (2016) looked at reduced ratio of the ingredients to 174: 7 g meal to malt, respectively. Less of the ingredients were used per final volume and resulted in oshikundu similar to some sourced from local households.

Sensory studies to characterise the sensory quality parameters and consumer acceptance of this drink should also be conducted. This can lead to a better understanding of the drink and ultimately to its potential commercialisation.