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# Evaluation of Forage Crops Production and Quality of Two Different Rangelands in Sulaimani Governorate

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## ABSTRACT

This study was conducted during 2015 in Sulaimani governorate at two main different locations of Sharbazher, Dukan, each one with some sub-locations, the sub- location of sharbazher that contains (Qalachwlan, Bnawela, Kana-Swra, Byana, Bazarw and Kane-Bewka) . The sub- location of Dukan that contains (Mergapan, Kwera-Kane, Hanaran, Qzlar and Kilka-Smaq) to estimate fresh yield, dry yield, dry matter and animal unit. The rangeland areas of Sulaimani governorate located between $35^0$ 10' – $36^0$ 27' N and $44^0$ 40' – $46^0$ 22' E were restricted, 250017 and658801 ha for Sharbazher and Dukan locations respectively. The most important results indicated that, it was noticed that the sub-location of Qalachwalan at sharbazher location gave the maximum values of plant height, stem dry weight, leaf dry weight and Leaf Stem ratio for both legumes and grasses with 27.22, 52.9 cm, 5.28% and1.80% as the means of nine replicates respectively. However, the sub-location of Mergapan at Dwkan location gave the maximum values of plant height with 40.43, 69.00cm for both legumes and grasses respectively.Dukan location gave the maximum value of total dry yield 970431.60 ton and 2940701.80 Animal unit/three months, while Sharbazher location which gave the minimum value total dry yield of 17216.20 ton and 52170.30 animal unit/3 months as the means of four replicates respectively. The highest fresh yield, dry yield and animal unit obtained Dukan, location which 13348.27 and 2554.85 kg/ha 2940701.80 animal unit respectively .Results of chemical analysis for the grass and legume plants showed that there were differences between locations. Dukan location gave the maximum percentage of protein content, Carbohydrate, fiber, and magnesium which were (8.75, 17.80 ,19.50 , and 0.74 %) respectively, for legume plants .However, chemical contents for grass plant showed that Sharbazher location gave the maximum percentage of carbohydrate, fiber, oil , phosphorous and ash contents which were (22.28 , 23.50 , 1.22 , 1.33 and 11.01 %), respectively.



## NTRODUCTION

The climate of Kurdistan is known as an arid climate, the summer is dry hot and cool winters, with an amount of rainfall which is sufficient to support dry farming activities. The three summer months of year from June to September are completely dry, and there is no rain. The total annual precipitation may range between 500-900 mm per annual in one geographic belt in the valleys and foothills and varying between 850-1350 mm in the high mountain. However, the annual precipitation varies between a dry to wet years.

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In addition, monthly rainfall also varies during the periods extending from October to June of every season. (Amin, 2003, 2006).In general, there are ecological important environmental factors (light, temperature and water (precipitation) affecting rangeland plant growth and development; light is the fundamental factor in photosynthesis and changes in day length (photoperiod) regulate phonological development of rangeland plants. More over temperature is a factor because both low and high temperatures limit plant growth, most plant activities and growth occur within only narrow range of temperature (0-50 °C) and water (precipitation) is an important component which is necessary in plant physiological processes (Manske, 2000). For instance, Sternberg *et al.(* 2000).Carrying capacity and stocking rate are theories that are used to determine the proper balance between livestock grazing and pasture plant productions. Stocking rate is defined as a number of grazing animals on the pasture for a given period of time. (Hart *et al.*, 2008)..Productivity is important in a rangeland setting for providing increased forage material, and has been recommended as an indicator of ecological function (Hooper *et al.*,2005; Kirwan *et al.*, 2007).

There are many factors that could lower or ameliorate the quality and quantity of forage. For examples, the availability of water, soil fertility, use of new production techniques, introduction of forage legumes or mix planting of forage legumes and cereal has been indicated by ( Omer 2011). Evaluation of rangelands mean identification and estimation of the potential and actual production of rangelands with the utilization of this valuable natural resources (Angassa *et al.*,2006).

For that reasons, recently rangeland monitoring is employed by rangeland managers to quantify, evaluate, monitor and the management practices require adaptive management strategies (Boswell, 2015). Rangelands are typically characterized by low precipitation, shallow soils and slow nutrient cycling. They are usually dominated by grasses, forbs and shrubs efficient for water and nutrient utilization, so their practices that are such as to temperate pastures, such as fertilization and plowing, are often inappropriate on rangelands (Rinehart, 2006). In Iraq the most rangeland is located in center and characterized by low pasture potential, so that the productivity and feeding condition of livestock, naturally limited by the lands'pasture potential, are not optimum (Omer, 2011).

This study was done to evaluate forage crops production and quality in Sulaimani, hence the objective of this investigation was to evaluate the carrying capacity of the rangelands of Sulaimani governorate including sharbazher and dukan in term of biomass production and the quality of produced forages.

## Materials and methods

This study was conducted in Sulaimani governorate, located on northeast Iraq and southeast of Iraqi Kurdistan region at 35° 10' - 36° 27' N and 44° 40' - 46° 22' E (Figure 1)

The study included two main locations each one with some sub-location at 2015 shows (Table 1). The main locations are different climatically with total annual rainfall about (740.5 and 654.6 mm) for Sharbazher, and Dukan locations, respectively, the mean for maximum temperature were 32.4, and 36.5C, while for minimum temperature were 2.9, and7.6 C for Sharbazher and Dukan respectively, (Table 2 ), which affected the plant material depending on climate and the variation of weather events within the climate.

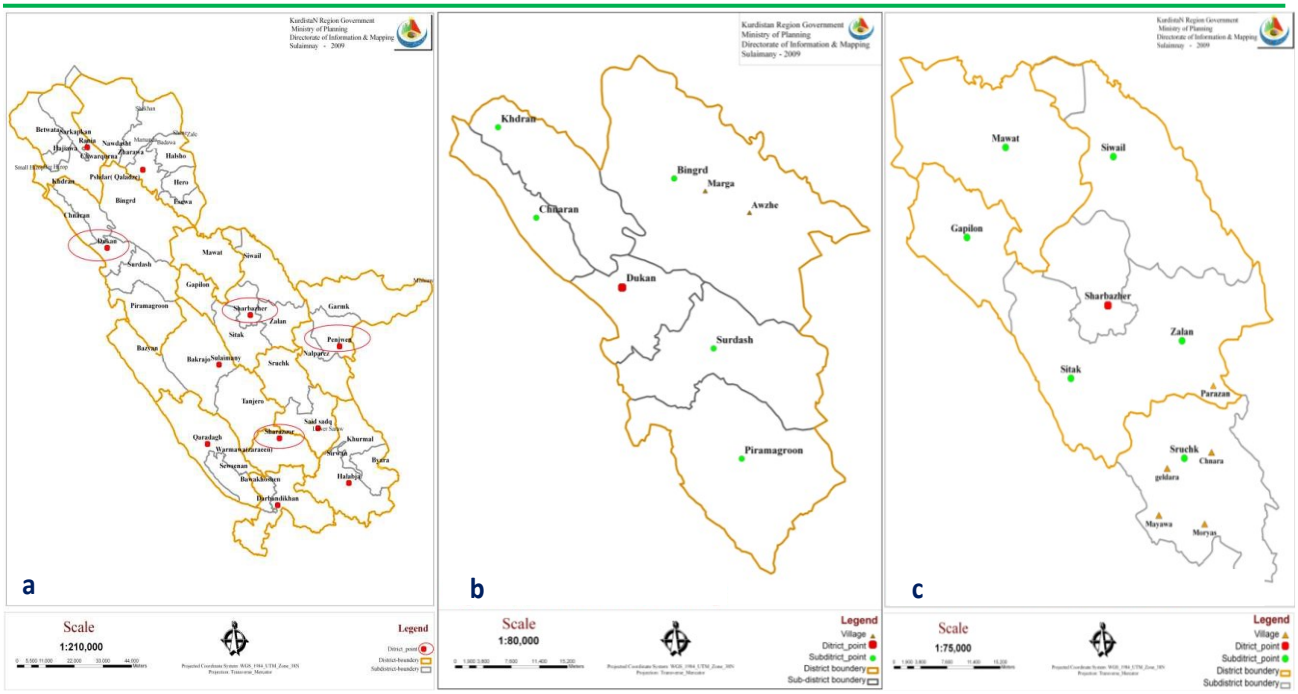


**Figure 1:** Map scale of the study area, (a) Sulaimani region, (b) Dukan district, (c) Sharbazher district

**Table (1)** The main and sub-locations of the studied area.

| | **Main Location** | | |
|---|---|---|---|
| **Sub-locations** | | **Sharbazher** | **Dukan** |
| | 1 | Qalachwlan | Mergapan |
| | 2 | Bnawela | Kwera-Kane |
| | 3 | Kana-Swra | Hanaran |
| | 4 | Byana | Qzlar |
| | 5 | Bazarw | Kilka-Smaq |
| | 6 | Kane-Bewka | --- |

**Table (2)** Rainfall, Temperature of Sulaimani governorate during (2015)

| **Month** | **Rainfall (mm)** | | **Temperature °C** | |
|---|---|---|---|---|
| | **Dukan** | **Sharbazher** | **Dukan** | **Sharbazher** |
| **October** | 70.2 | 152.5 | 23.5 | 18.0 |
| **November** | 207.7 | 129.0 | 13.7 | 7.0 |
| **December** | 69.4 | 102.0 | 8.5 | 2.9 |
| **January** | 75.7 | 100.0 | 7.6 | 3.9 |
| **February** | 35.8 | 59.0 | 9.9 | 7.1 |
| **March** | 123.4 | 108.0 | 13.4 | 10.5 |
| **April** | 45.3 | 42.0 | 17.8 | 14.9 |
| **May** | 6.6 | 22.0 | 26.3 | 20.3 |
| **June** | - | - | 32.7 | 28.0 |
| **July** | - | - | 36.5 | 32.4 |
| **August** | - | - | 36.3 | 31.83 |
| **September** | 20.5 | 26.0 | 31.7 | 28.2 |
| **Total** | 654.6 | 740.5 | | |

The study was included survey of the forage crops (legumes and grasses) around the Sulaimani governorate for one season (2015). The samples were randomly taken in two different locations (Sharbazher, and Dukan) each with some sub- locations as shown in (Table 1), using quadrate (50 x 50 $cm^2$) vegetation cover (legume, grass, and mixture of grasses and legume) (Table 3), within the quadrate were cut at 2.5 cm above soils surface, then the total fresh weight from legumes plant, grasses and mixture was taken. Hundred grams of total fresh weight was separated into leaf and stem and put them in an oven at 75°C for 48 hours. After the constant weight at room temperature the stem and leaf dry weight were taken using balance. The comparison was conducted using standard error with the following formula:

$SE = \frac{S}{\sqrt{N}}$ (Lee 2007) Family:

**S** = standard deviation
N= number of samples

**Study characters: -**

- Plant height (cm),
- Fresh forage yield (Kg/ ha)
- Dry forage yield (Kg/ha)
- (Dry forage yield (Kg/ha) = fresh yield (Kg/ha**)** x dry matter %)
- Dry matter percent
- Leaf dry weight percent
- Stem dry weight percentage
- Leaves / stem ratio
- Animal Unit/3 Months: was calculated according to the following formula as described by Darrag (1996):
-

$$A.U3M = \frac{Available\ forage\ \left(\frac{Kg}{Ha}\right)}{Animal\ requirements X\ 3\ Month}$$

( Manske 1998 )

* Animal requirement/ month = 55 kg for goat and sheep.
* Using factor = 50%

**Table 3:** Scientific names of common forages of *Fabaceae* and Gramineae(Poaceae) family in Sulaimani governorate (Al-Mashhadani *et al*., 2009)

| No. | Genus | Species | No. | Genus | Species |
|---|---|---|---|---|---|
| 1 | *Lathyrus* | *aphaca* L. | 20 | *Trigonella* | *speciosum* Willd. |
| 2 | | *cicero* L. | 21 | | *monspeliaca* L. |
| 3 | | *erectus* Lag. | 22 | *Vicia* | *aintabensis* Boiss. |
| 4 | | *nervosus* Boiss | 23 | | *cracca* L. |
| 5 | *Medicago* | *coronate* L. M. | 24 | | *ervilia* Willd. |
| 6 | | *lupulina* L. | 25 | | hybrida L. |
| 7 | | *noeana* Boiss. | 26 | | narbonensis L. |
| 8 | | *orbicularis* Bartal. | 27 | | *sativa* L. |
| 9 | | *polymorpha* L. | 28 | | *tenifolia* Roth |
| 10 | | *rigidula* L. | 29 | *Trigonella* | *filipes* Boiss. |
| 11 | | *sativa* L. | 30 | | *foenum-graecum* L. |
| 12 | | *tuberculata* Willd | 31 | | *monspeliaca* L |
| 13 | *Hordeum* | *bulbusum* L. | 32 | *Trifolium* | *arvense* L |
| 14 | | *fragile* Boiss. | 33 | | *cherleri* L. |
| 15 | | *spontanum* | 34 | | *echinatum* M.B. |
| 16 | *Lolium* | *rigidum* Gaud. | 35 | | *fermosum* Urb. |
| 17 | | *temulentum* L. | 36 | | *pilulare* Boiss. |
| 18 | *Avena* | *fatua* L. | 37 | | *purpureum* Loisel |
| 19 | | | | | |
| | | | 38 | | *repens* |

- **Chemical Component:** The chemical composition of stem and leaves were determined for both legumes and grasses plants on dry weight basis, one gram of the dried samples were taken and digested with 10 ml of $H_2SO_4$ and 10 ml $H_2O_2$ (except for fiber and carbohydrate) for determining each of protein, oil, phosphorus, potassium, calcium and magnesium) using the kjeldahl apparatus and the results were presented as a percent ratio of each content.
- The analyses were carried out in the laboratory of Faculty of Agricultural Engineering Sciences University of Sulaimani as described below: Protein content, Carbohydrate content, Fiber content, Oil content, Phosphorus content, Potassium content, Calcium content, Magnesium content, Ash content.

- **Protein content:** The protein was micro chemical determination of Nitrogen, Micro- Kjeldahl method (AOAC, 2005).
- **Carbohydrate content:** The carbohydrate was determined using DNC method (Gaewchingduang and Pengthemkeerati ,2010)
- **Fiber content:** The fiber was extracted using chemical material ($H_2SO_4$, NaOH) according to AOAC (2005).
- **Oil content:** The oil was extracted using the instrument using Soxhlet apparatus (AOCS, 2004).
- **Phosphorus content:** The phosphorus was determined using Olsen's method according to ICARDA method as described by George *et al.* (2013).
- **Potassium content:** The potassium was determined using flame photometric according to

ICARDA method as described by George *et al.*( 2013)

- **Calcium content:** The calcium was determined by titrimetric method using 0.01N EDTA, according to ICARDA method as described by George *et al.*(2013)
- **Magnesium content:** magnesium was determined by titrimetric method using (0.01N) 2Na-EDTA disodium, according to ICARDA method as described by George *et al.*(2013)
- **Ash content:** The ash was determined using the instrument called muffle furner (AOCS, 2004).

Sampling was carried out on April and May2015, when almost all the pasture plants were fully-growth to their vegetation stage at %50 flowering.

## RESULTS AND DISCUSSION

### Vegetation covers

Table 4 represents the plant height and leaf stem ratio for grasses and legumes in Sharbazher location, the highest plant height of legumes (39.75cm) was recorded at Byana sub-location as a means of four replications, while the Sub-location of Kana -Swra exhibited the lowest legume plant height (16.00cm) as a mean of four replications. Regarding the grasses plant height, as recorded at Qalachwlan, the maximum plant height was 52.9cm as a means of nine replicates, while the lowest value (39.00cm) was obtained at Kanaswra as a mean of four replicates. At the same table it was noticed that leaf dry weight percent was 9.17% as a means of four replicates at Bnawela.Whereas the sub-location of Kane- Bwka as a mean of four replicates gave the lowest legume leaf dry weight 6.45%. The highest stem dry weight was 5.28% as a mean of nine replicates at Qalachwlan, while the lowest stem dry weight was produced by the sub-location of Bazarw (3.04%) for legume, and the maximum leaf stem ratio for legumes was 2.73% as a mean of five replicates at Bazarw, in which the minimum leaf stem ratio was 1.46% recorded in Qalachwalan as a means of nine replicates For grasses, the highest leaf dry weight and leaves stem ratio were 6.12 and 1.80% respectively as a mean nine replicates in Qalachwalan. In which kanaswra gave the maximum value stem dry weight for grass with 6.44% as a mean four replicates, while Qalachwalan as a mean of nine replicates produced the lowest stem dry weight which was (3.40%) and the minimum leaves stem ratio for grass was 0.59% as a mean of four replicate in kanaswra. The results obtained here are in accordance to the previous results Angassa *et al.*(2006)and Rafaat(2010).

**Table (4)** Effect of location on studied characters of legume and grasses in Sharbazher location.

| Location | | Sub-location | Replicates number of samples | Plant Height (cm) | | Legumes | | | Grasses | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Legumes | Grasses | Leaf D.W% | Stem D.W% | Leaf Steam ratio | Leaf D.W% | Stem D.W% | Leaf Stem ratio |
| Sharbazher | 1 | Qalachwlan | 9 | 27.22 | 52.9 | 7.72 | 5.28 | 1.46 | 6.12 | 3.40 | 1.80 |
| | 2 | Bnawela | 4 | 23.67 | 41.01 | 9.17 | 5.15 | 1.78 | 5.32 | 5.01 | 1.06 |
| | 3 | Kana- Swra | 4 | 16.00 | 39.00 | 7.26 | 4.01 | 1.81 | 3.86 | 6.44 | 0.59 |
| | 4 | Byana | 4 | 39.75 | 48.67 | 6.89 | 4.11 | 1.67 | 4.37 | 5.82 | 0.75 |
| | 5 | Bazarw | 5 | 20.43 | 47.67 | 8.31 | 3.04 | 2.73 | 4.18 | 4.68 | 0.89 |
| | 6 | Kane-Bweka | 4 | 25.60 | 44.00 | 6.45 | 3.95 | 1.63 | 3.53 | 5.49 | 0.64 |
| S.E | | | | 3.29 | 2.11 | 0.40 | 0.34 | 0.18 | 0.39 | 0.42 | 0.18 |

D.W%: Dry weight percent SE: Standard error

Table 5 shows the presence of differences among the sub-locations of Dukan, it was noticed that the sub-location of Mergapan gave the maximum values of plant height for both legumes and grasses with 40.43 and 69.00 cm, respectively, while Kilkasmaq showed the lowest values of plant

height 30.67 and 45.67cm as the means of four replicates for legumes and grasses, respectively. Leaf dry weight gave the maximum values of 10.58% as a mean of four replicates in Kilka- Smaq, while Qzlar gave the maximum value of 6.90% for stem dry weight as a mean of five replicate. The highest value leaf stem ratio for legumes of 1.82% obtained by the Mergapan, Swrdash and Kilkasmaq as a mean of nine, five and four replicates for legumes plant respectively, while the lowest value of leaf stem ratio for legumes of 1.44% was recorded for five replicates at Qzlar .However, for grasses plant ,the highest value were 6.32 and 7.37% as the means of nine replicates in Mergapan for leaf dry weight and stem dry weight, in which Swrdash gave the maximum values leaf stem ratio of with 1.04% as a mean of five replicates for leaf stem ratio. Regarding Kwera-Kane gave the minimum values of 2.16 and 2.40% for leaf dry weight and stem dry weight as a mean of five replicates respectively. While Kilka-Smaq gave the minimum value of 0.77% as a mean of four replicates for leaf stem ratio. The obtained results are in agreement with those of Qi (2002) and Rafaat(2010).

**Table (5)** Effect of location on studied characters of legume and grasses in Dukan location.

| Location | Sub-location | | Replicates number of samples | Plant Height (cm) | | Legumes | | Grasses | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Legumes | Grasses | Leaf D.W% | Stem D.W% | Leaf stem ratio | Leaf D.W% | Stem D.W% | Leaf stem ratio |
| Dukan | 1 | Mergapan | 9 | 40.43 | 69.00 | 7.63 | 4.19 | 1.82 | 6.32 | 7.37 | 0.85 |
| | 2 | Swrdash | 5 | 31.80 | 57.20 | 8.22 | 4.51 | 1.82 | 3.74 | 3.57 | 1.04 |
| | 3 | Kwera - kane | 5 | 32.00 | 65.67 | 9.47 | 6.50 | 1.45 | 2.16 | 2.40 | 0.90 |
| | 4 | Hanaran | 5 | 33.67 | - | 10.53 | 5.98 | 1.76 | - | - | - |
| | 5 | Qzlar | 5 | 31.00 | - | 9.99 | 6.90 | 1.44 | - | - | - |
| | 6 | Kilkasmaq | 4 | 30.67 | 45.67 | 10.58 | 5.79 | 1.82 | 5.24 | 6.74 | 0.77 |
| | | S.E | | 1.49 | 5.20 | 0.50 | 0.44 | 0.07 | 0.90 | 1.20 | 0.05 |

D.W%: Dry weight percent SE: Standard error

## Forage yield

Table 6 shows differences between Sharbazher sub-locations for fresh yield, dry matter percentage and dry yield .The sub-location of Byana gave the maximum fresh yield and dry yields with 15232.8 and 3229.35 kg/ha, as the means of four replicates respectively, while the lowest fresh and dry yield were produced by Bazarw sub- location with 10625.2 and 1959.28 kg/ha, as the means of five replicates respectively. Regarding dry matter percentage, the maximum value of 21.58% was recorded for Kana-swra sub-location as a mean of four replicates, while the minimum value for dry matter was 16.74% as a mean of nine replicates at Qalachwalan. These results are also in line with Olanite *et al.* (2004). Smilar results were obtained by Rafaat (2010) at other location in Sulaimani governorate.

**Table (6)** Effect of locations on forage yield for Sharbazher location .

| Location | Sub-location | Rep.No of samples | Fresh yield (Kg/ha) | Dry Matter (%) | Dry yield (Kg/ha) |
|---|---|---|---|---|---|
| Sharbazher | Qalachwlan | 9 | 13401.60 | 16.74 | 2243.42 |
| | Bnawela | 4 | 11865.60 | 19.49 | 2312.60 |
| | Kana- Swra | 4 | 12672.00 | 21.58 | 2734.61 |
| | Byana | 4 | 15232.80 | 21.20 | 3229.35 |
| | Bazarw | 5 | 10625.20 | 18.44 | 1959.28 |
| | Kane- Bewka | 4 | 10752.80 | 19.42 | 2088.19 |
| S.E | | | 712.90 | 0.72 | 193.10 |

Data in Table 7 established the presence of differences among the sub-locations of Dukan location in fresh, dry yields and dry matter percentage, it was noticed that mergapan Sub.location with 17275.60 kg/ha gave the highest fresh yield but the sub-location of Qzlar with 7057.60 and 1192.73 kg/ha of fresh and dry yields, while the highest value of dry yield exhibited at Kwera-Kani with 3143.65 as a mean of five replicates respectively, showed the lowest values. Concerning dry matter percentage, it was ranged between 16.51 and 22.73% for both sub-locations of Hannaran and Kilka-smaq, respectively. The variation in the biomass produced between these two sites might be refer to the fluctuated precipitation Bunderson *et al.* (1984).

**Table (7)** Effect of locations on forage yield for Dukan location .

| Location | Sub-location | Rep.No of samples | Fresh yield (Kg/ha) | Dry Matter (%) | Dry yield (Kg/ha) |
|---|---|---|---|---|---|
| Du kan | Mergapan | 9 | 17275.60 | 18.10 | 3126.88 |
| | Swrdash | 5 | 11386.00 | 20.05 | 2282.89 |
| | Kwera- Kane | 5 | 15297.60 | 20.55 | 3143.65 |
| | Hanaran | 5 | 16037.60 | 16.51 | 2647.80 |
| | Qzlar | 5 | 7057.60 | 16.90 | 1192.73 |
| | Kilkasmaq | 4 | 13035.20 | 22.73 | 2962.90 |
| S.E | | | 1527.27 | 0.97 | 304.31 |

Data in Table 8 shows that the location of Dukan produced the highest fresh and dry yields with 13348.27 and 2554.85 kg/ha, respectively, but the lowest fresh and dry yields produced by the location of Sharbazher with 12425.00 and 2420.39 kg/ha, respectively. Regarding dry matter percentage, it was ranged between (19.48- 19.14%) for Sharbazher and Dukan locations respectively.The out yielding of Sharbazher location resulted in the suitability of its environmental condition especially the amount and the monthly distribution of rainfall and temperature (Table 2).

**Table (8)** The mean of fresh and dry forage yields and dry matter percent of Sharbazheer and Dukan locations.

| NO. | Location | Fresh yield (kg/ha) | Dry matter (%) | Dry yield (kg/ha) |
|---|---|---|---|---|
| **1** | Sharbazher | 12425.00 | 19.48 | 2420.39 |
| **2** | Dukan | 13348.27 | 19.14 | 2554.85 |
| **X** | | 12886.63 | 19.31 | 2487.62 |
| **S.E** | | 461.634 | 0.17 | 67.23 |

## Carrying capacity and Rangeland

Data in Table 9 shows the total area, total yield and animal unit/3month for all locations, recording in the main locations used in this survey. Regarding the total area, it was observed that Dukan location gave the maximum of total area, rangeland, and total yield/ton with 658801.0 ha, 379839.0 ha and 970431.6 ton, respectively, while the minimum total area exhibited in sharazoor location 126546.0 ha. As shown in this Table, the minimum rangeland and total yield were 7113.0 ha, 17216.2 ton for the location of Sharbazher, respectively. Assuming that the monthly required forage is 55 kg and the proper range use is 50%, the animal unit for three months can be calculated as reported in Table 4.10 according to Darrag(1996), who reported that the carrying capacity is usually determined using the proper use factor (PUF) of 50% in which only one half of forage biomass produced is considered as available for grazing. The location of Dukan was able to

provide forage for the maximum number of animal/3months which was 2940701.8 A.U. /3M,. Sharbazher can provide the forage for the minimum number of animals 52170.3 A.U. /3M. Mohamed *et al.* (2015) investigated that the carrying capacity may vary from location and from year to year in the same area as a result of damage by man or animals or forage production may fluctuate according to the rainy season. The differences in plant height due to all locations were affected in forage yield, and also carrying capacity. It was observed that there were differences between locations for all characters. These results were agreed with the previous studies, which confirm the importance of climatically condition in determining rangeland production and carrying capacity (Van Horn *et al.*, 1996) and (Rafaat,2010).

**Table (9)** The mean of Total area, rangeland, total yield (ton) and animal unit/3 months for Sharbazheer and Dukan locations.

| NO. | Location | Total area (ha) | Range land (ha) | Total dry yield (ton) | Animal unit/3month |
|---|---|---|---|---|---|
| **1** | Sharbazher | 250017.00 | 7113.00 | 17216.20 | 52170.30 |
| **2** | Dukan | 658801.00 | 379839.00 | 970431.60 | 2940701.80 |
| **x** | | | | 493823.9 | 1496436.05 |
| **S.E** | | | | 476607.7 | 1444265.9 |

## Forage quality and Chemical Component:

Results of chemical analysis for legume plants was recorded in Table 10. The maximum protein,carbohydrate,fiber and magnesium content in legume plants exhibited by Dukan location was 8.75, 17.80, 19.50 and 0.74 respectively. While the lowest protein, carbohydrate, fiber and magnesium content 6.12, 14.88, 18.00 and0.02 % respectively, was obtained in sharbazher location. As shown in the same Table, Sharbazher location showed the maximum value 1.68, 1.20, 0.95, 0.42and 12.37 of oil, phosphorus, potassium, Calcium and Ash contents respectively.
This result was in agreement with Njidda (2010), while the results disagree with those recorded by Rafaat (2010) due to difference in the sub-location of the study.

**Table (10)** Effect of locations on Chemical contents percent of legume plants for Sharbazheer and Dukan locations.

| NO. | Locations | Protein | Carbohydrate | Fiber | Oil | P | K | Mg | Ca | Ash |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | Sharbazher | 6.12 | 14.88 | 18.00 | 1.68 | 1.20 | 0.95 | 0.02 | 0.42 | 12.37 |
| **2** | Dukan | 8.75 | 17.80 | 19.50 | 1.43 | 1.19 | 0.90 | 0.74 | 0.20 | 10.81 |
| x | | 7.43 | 16.34 | 18.75 | 1.55 | 1.19 | 0.92 | 0.38 | 0.31 | 11.59 |
| **S.E** | | 1.315 | 1.46 | 0.75 | 0.125 | 0.005 | 0.025 | 0.36 | 0.11 | 0.78 |

Table 11 shows that the chemical composition of grass plants is differing among the studied locations. Regarding protein content, it was established that the location of Dukan with 6.12% exceeded Sharbazher locations, whereas Sharbazher location produced the lowest protein content in grass plants which was 4.34%. Sharbazher location gave the maximum value 22.28 ,23.50,1.22,1.33 and 11.01 % for carbohydrate, fiber, oil ,Phosphorus and Ash content respectively, while the lowest value ,18.97,19.50,0.75,1.16 and 9.74% was recorded at Dukan location respectively. Whereas Sharbazher location produced the lowest potassium, magnesium and calcium, content in grass plants which was 0.83, 0.08 and 0.10% respectively. This result was in agreement which was investigated that by Ganskopp & Bohnert (2003). This fluctuation in results of chemical analyses may be due to variation in soil chemical, physical and biological proportion in addition to variation in climate among the

studied locations (table 2). It is appeared from chemical analyses of legume and grass plants, that most of the studied parameters were higher in legume plant except carbohydrate and fiber which were higher in grass plants. The highest mean value of most of the studied parameters in legume like protein, oil, P, K, Mg, Ca, and ash maybe due the higher root cation exchange capacity (RCEC) of legumes in compare with its value for grass which were 60 and 15 meq/100g dry root respectively Mengel and Kirkby (2001).

**Table (11)** Effect of locations on Chemical contents percent of grass plants for Sharbazheer and Dukan locations.

| | Location | Protein | Carbohydrate | Fiber | Oil | P | K | Mg | Ca | Ash |
|---|---|---|---|---|---|---|---|---|---|---|
| **2** | Sharbazher | 4.34 | 22.28 | 23.50 | 1.22 | 1.33 | 0.83 | 0.08 | 0.10 | 11.01 |
| **3** | Dukan | 6.12 | 18.97 | 19.50 | 0.75 | 1.16 | 0.91 | 0.42 | 0.11 | 9.74 |
| x | | 5.23 | 20.62 | 21.5 | 0.98 | 1.24 | 0.87 | 0.25 | 0.10 | 10.37 |
| SE | | 0.89 | 1.655 | 2.00 | 0.235 | 0.085 | 0.03 | 0.17 | 0.005 | 0.635 |

## Conclusions

From the results of this study it was noticed that the sub-location of Qalachwalan at sharbazher location gave the maximum values of plant height, stem dry weight, leaf dry weight and Leaf Stem ratio for both legumes and grasses, in which the sub-location of Byana at sharbazher gave the maximum fresh yield and dry yields. It can be concluded from the results that, the different locations gave the variable forage yield and chemical composition. Rangeland management plan should include grazing management with the purpose of increasing the vegetation cover and protect the pasture from the over grazing.

Also, from the results of this study it is conclude that Sharbazher location was higher than the Dukan location for Dry matter, and Dukan location was able to provide forage yield for maximum number of animal /3 months. The result of chemical analysis for legumes and grass indicated the differences between two contents. The location of Dukan gave maximum value for protein, carbohydrate, fiber and magnesium, for legume plants, While Sharbazher location showed the highest protein, carbohydrate, fiber, oil ,Phosphorus and Ash contents for grass plants.

## Recommendations:

1. Making map for all the pastures in Kurdistan to facilitate the most proper grazing plan.
2. Provide water sources for the pastures especially in the dried seasons.
3. Improving the quantity and quality of forages and carrying capacity of seasonally grazed areas indirectly through improving the condition of communally grazed areas by reducing grazing pressure.

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# تقييم انتاج ونوعية محاصيل العلف لبعض المراعي المختلفة في محافظة السليمانية

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قسم بايوتكنولوجى والمحاصيل الحقلية – كلية علوم هندسة الزراعية في جامعة السلبمانية فى اقليم كردستان

**المستخلص**

دراسة تقييم مراعى الاعلاف تم تنفيذها فى محافظة السليمانية لأربعة مواقع مختلفة وشملت شاربازيرو دوكان بضمنها المواقع الثانوية لكل موقع رئيسي، ان المواقع الثانوية لشاربازير شملت ( قةلاجوالان ، بناويلة، كانة سورة ،بيانة بازةرو ، كانى بيوكة ) والمواقع الثانوية لدوكان شملت (ميركة بان ، كويرة كانى ، هةناران ، قزلر وكلكة سماق ) خلال عام 2015، وذلك لتقدير الحاصل العلف الاخضر والحاصل الجاف والمادة الجافة والوحدة الحيوانية. ان مساحة المراعي لمحافظة السليمانية تقع بين خطى عرض '27 º 36 - '10 º35 شمالا وخطى طول '22 º 46 - '40 º 44 شرقا بمساحة 250017.00 و658801.00 هكتار من موقع شاربازير ودوكان . دلت نتائج على ان الموقع الثانوى لقلاجوالان فى شاربازير اعطى اعلى نسبة لارتفاع النبات ووزن السيقان الجافة ووزن الاوراق الجافة ونسبة الاوراق على السيقان لنباتات البقول والحشائش، فيما اعطى الموقع الثانوى اميركةبان فى موقع دوكان النسبة الاعلى للارتفاع النبات للبقول والحشائش.

اشارت النتائج الى ان الموقع الثانوى لبيانة فى شاربازير اعطى القيمة الاعلى لحاصل العلف الاخضر والجاف. ولوحظ ان الموقع الثانوى اميركةبان فى دوكان اعطى اعلى القيمة للحاصل العلف الأخضر، بينما كلكة سماق اعطى اعلى القيمة للعلف الاخضر و الجاف فى نفس الموقع.

اشارة النتائج الى ان موقع دوكان اعطى الاعلى القيم لحاصل العلف الجاف والاخضر ووحدة حيوانية، فيما اعطى موقع شاربازير القيمة الادنى للحاصل العلف الجاف والعلف الاخضر ووحدة. اظهرت النتائج لتحليل المكونات الكيمياوية لنباتات الحشائش والبقول اختلافات بين الموقعين، فموقع دوكان اعطى النسبة الاعلى لمحتوى البروتين والكربوهيدرات والالياف والمغنيسيوم لنباتات البقول في حين ان موقع شاربازير اعطى النسبة الاعلى لمكونات والكربوهيدرات والالياف والزيت والفسفور و الرماد.

**الكلمات المفتاحية** : المراعى ، الوحدة الحيوانية ، حاصل العلف ، نوعية العلف ، محاصيل العلف.