FORAGE ECONOMICS CALCULATOR
WEB APPLICATION

USER-INSTRUCTIONS

CREATED BY

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Forage Economics Calculator: User Instructions

Introduction

The "Forage Economics Calculator" webtool can generate economic analysis outputs involving forage crop production, harvesting, baling, aggregation, labor, fuel cost, and the revenue generated from selling the bale forage or biomass. Emphasis is given to the bale aggregation operation, while the other operations are taken as direct inputs. The tool's interface is designed to be user-friendly and dynamic that requires minimal inputs from the user.

The tool consists of inputs and results panel with buttons to perform relevant actions. The input values when fed through the input panel and their respective outcomes are dynamically generated and displayed in the results panel of the calculator. Default input values were already available as starters and dynamic arrow indicators, sensitive to bottomline, show the optimum cutoff levels.

This document is the user-instructions which describes how to use the "Forage Economics Calculator" web tool through its web-browser interface. It assumes that the user's system is already directed to the tool's web page.

Detailed information on the items present in the web tool is presented in the "Web Application User Manual," and a read is recommended.

Step 1: Input drop-down option

Drop-down inputs are already loaded with default options, and however can be changed using the instructions below:

1. **Open list:** Click on the drop-down list to view the options listed

2. **Scroll items:** Hover over the desired option on the list

3. **Select item:** Click to select

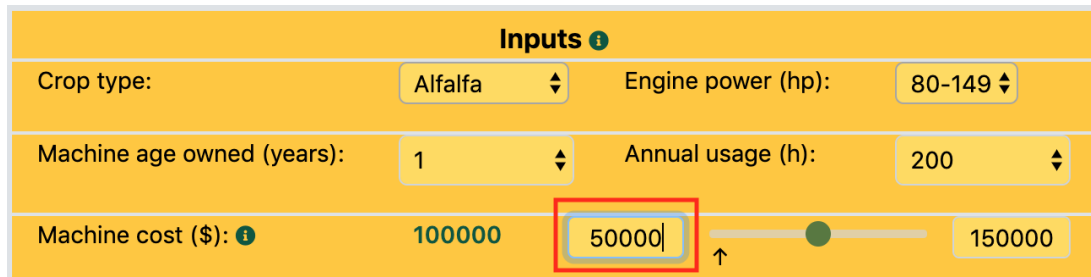Repeat instructions under "Step 1" for all the drop-down options.

Using drop-downs inputs, such as (1) Crop type, (2) Engine power, (3) Machine age owned, (4) Annual usage, and (5) Number of field units are fed.

Step 2: Slider inputs

Sliders are used to input values graphically by moving the slider between the lower and upper limits provided. A default is already selected and the value is shown on the left.
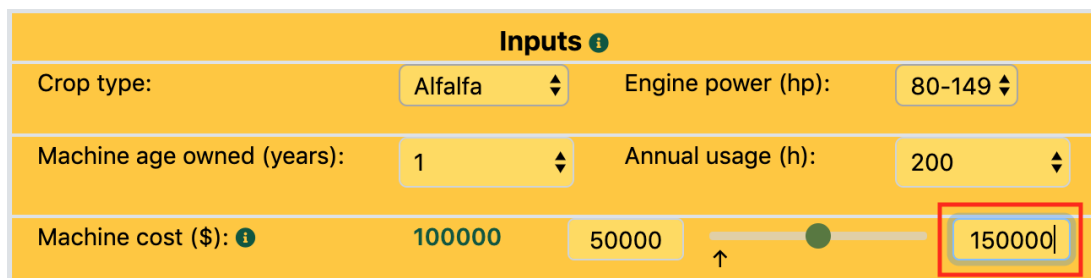
The minimum and maximum range values of the slider are given as default, however can be changed following the instructions below. Actual values are input through the slider position.

1. **Edit minimum:** Click on editable text-box placed on the left of the slider bar to enter the minimum limit value for the range
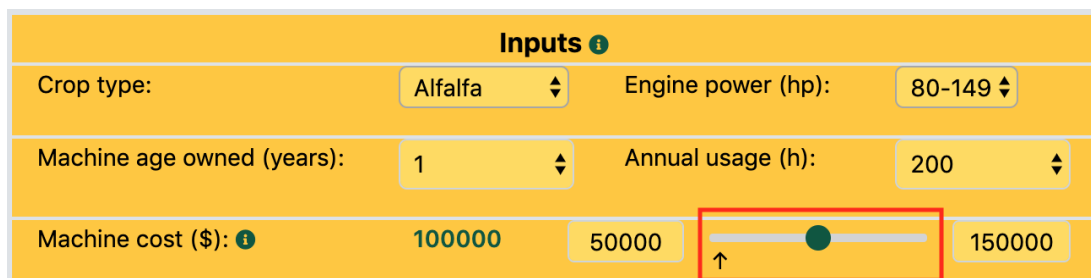

2. **Edit maximum:** Click on editable text-box placed on the right of the slider bar to enter the maximum limit value for the range

3. **Select slider:** Hover over the slider button to highlight.

4. **Slider input:** Click and drag the slider button over the bar to select a value between the set range

5. **Slider position - sensitivity:** A dynamic arrow indicates the cutoff value of the input the loss/profit, where the slider button on the left of arrow gives loss while right gives profit. This dynamic arrow help to eliminate the guesswork from the user to produce a positive bottomline.

Repeat instructions under "Step 2" for all the slider inputs.

Step 3: Number-box input

The editable number-box input only allows numbers to be entered. The number-box value can be changed to the desired value as follows:

1. **Select number-box:** Click on the editable number-box to select it.
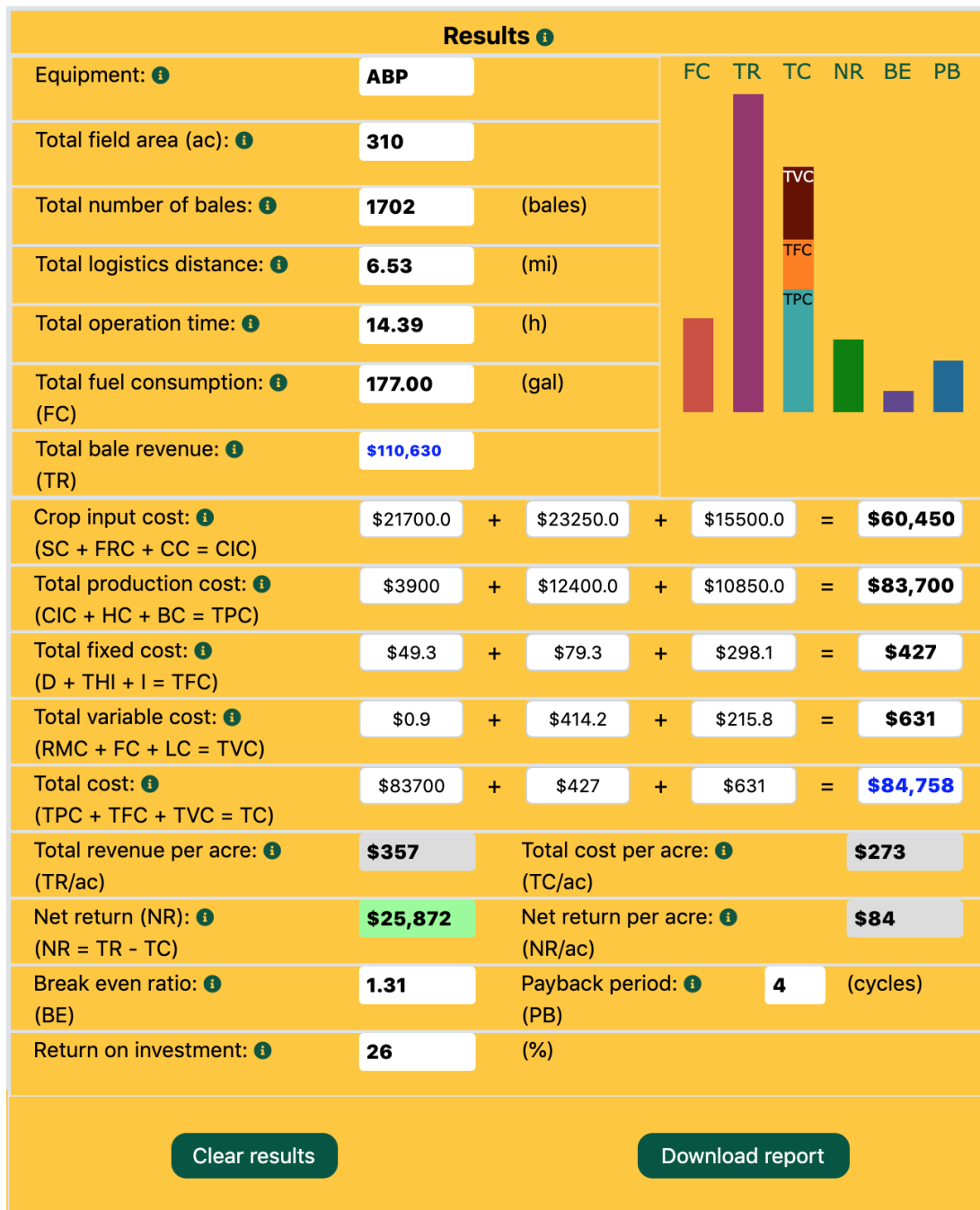

2. **Number-box input:** Values can be increased or decreased by clicking the up and down arrow present in the number-box.

Dynamic results - from the inputs

Steps 1, 2, and 3 generates live outcomes and dynamic plot on the results panel.

Results ℹ️			FC TR TC NR BE PB
Equipment: ℹ️	**ABP**		
Total field area (ac): ℹ️	**310**		
Total number of bales: ℹ️	**1702**	(bales)	
Total logistics distance: ℹ️	**6.53**	(mi)	
Total operation time: ℹ️	**14.39**	(h)	
Total fuel consumption: ℹ️ (FC)	**177.00**	(gal)	
Total bale revenue: ℹ️ (TR)	**$110,630**		
Crop input cost: ℹ️ (SC + FRC + CC = CIC)	$21700.0 +	$23250.0 +	$15500.0 = **$60,450**
Total production cost: ℹ️ (CIC + HC + BC = TPC)	$3900 +	$12400.0 +	$10850.0 = **$83,700**
Total fixed cost: ℹ️ (D + THI + I = TFC)	$49.3 +	$79.3 +	$298.1 = **$427**
Total variable cost: ℹ️ (RMC + FC + LC = TVC)	$0.9 +	$414.2 +	$215.8 = **$631**
Total cost: ℹ️ (TPC + TFC + TVC = TC)	$83700 +	$427 +	$631 = **$84,758**
Total revenue per acre: ℹ️ (TR/ac)	**$357**	Total cost per acre: ℹ️ (TC/ac)	**$273**
Net return (NR): ℹ️ (NR = TR - TC)	**$25,872**	Net return per acre: ℹ️ (NR/ac)	**$84**
Break even ratio: ℹ️ (BE)	**1.31**	Payback period: ℹ️ (PB)	**4** (cycles)
Return on investment: ℹ️	**26**	(%)	

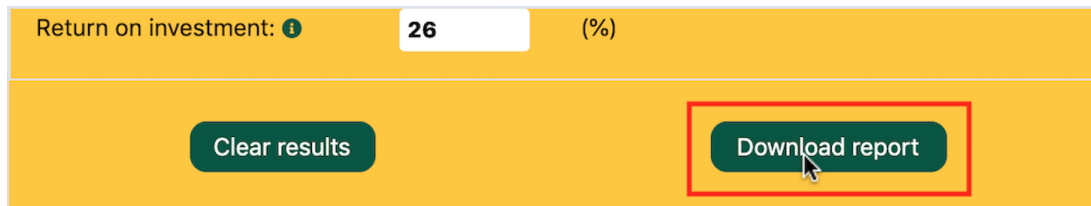| **Clear results**	**Download report**

The output "Net return (NR)" box is color-coded (green - profit; red - loss) to readily observe the outcome. The per-unit relevant results such as (1) Total revenue per acre, (2) Total cost per acre, and (3) Net return per acre were also shown as gray output boxes.

The dynamic plot serves as a ready-to-observe tool of the generated results, which can be used to easily compare the contribution of the various cost components.

Step 4: Download report

A report containing selected input values and the generated outcomes, which can be used of record keeping or comparison, can be accessed in a PDF format by following the instructions:

1. **Download report:** Click on the "Download report" button on the results panel to initiate the download process for the report.

2. **View report:** Once download is finished, click on the PDF file to view the report.

Forage Economics Calculator

Department of Agricultural and Biosystems Engineering, NDSU

Selected Inputs		**Generated Results**	
Crop type:	Alfalfa	Equipment:	ABP
Engine power (hp):	80-149	Total field area (ac):	60
Machine age owned (years):	1	Total number of bales:	444
Annual usage (h):	200	Total logistics distance (mi):	0.67
Machine cost ($):	100000	Total operation time (h):	1.46
Forage yield (lb/ac):	6500	Total fuel consumption (gal):	22.51
Bale mass (lb):	1100	Total bale revenue:	$20,150
Field area unit (ac):	60	Crop input cost:	$11,505
Number of field units (#):	1	Total production cost:	$15,930
Bales/trip:	8	Total fixed cost:	$43
Machine speed (mph):	5.25	Total variable cost:	$25
Bale sale price ($/bale):	65	Total cost:	$15,998
Seed cost ($/ac):	70	Total revenue per acre:	$342
Fertilizer cost ($/ac):	75	Total cost per acre:	$271
Chemical cost ($/ac):	50	Net return:	$4,152
Harvest cost ($/ac):	40	Net return per acre:	$70
Baling cost ($/ac):	35	Break even ratio:	1.2
Fuel cost ($/ac):	2.34	Payback period (cycles):	24
Labor cost ($/ac):	15	Return on investment (%):	4

Subhashree et al., (2020). Forage Aggregation Economics Calculator. Department of Agricultural and Biosystems Engineering, North Dakota State University, Fargo, USA.

Generated on: Thu May 14 2020 16:14:23 GMT-0500 (Central Daylight Time)

Step 5: Reset input values

1. **Reset inputs:** Click on the "Reset" button to reset all the input values to the default input values.

Step 6: Clear result values

1. **Clear results:** Click on the "Clear results" button to clear all the result values and the plot.

Any change in the inputs will bring the updated calculations and plots back.