

Where Should You Invest to Improve the Capacity of Your Harvesting System?

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Is mowing or chopping the more limiting operation in haylage harvesting? Mowing equipment, windrow mergers, and choppers come in a range of widths with self-propelled machines that can cost more than pull-type versions. To identify the economic way to maximize the system's capacity, one should compare costs of operating different sizes of equipment.

In a capacity analysis, consider: acres to be harvested, days available, hours of work time/day, labor and its cost, on-hand equipment and its condition, availability of capital for replacing worn-out machines. After inventory, calculate the capacity of each implement:

$$\text{acres/hour} = \frac{\text{swath width (in feet)} \times \text{operating speed (miles/hour)} \times \text{field efficiency (to account for turning time)}}{8.25}$$

Analysis may identify issues where implement sizes do not permit the harvest to be completed in the set days with available labor. Next, compare costs and labor requirements for adding a second implement of the same size vs. one larger one (if a second driver/tractor are not available, that eliminates the doubling-up option). Another question, are tractors and labor available to mow/chop at the same time? If both cannot be done simultaneously, can they be done sequentially? If the answers to both questions are "no," alternatives: 1) increase capacity of the mowing equipment, 2) increase capacity of the chopping equipment, or 3) add an operator and/or tractor so that both operations can be done at the same time.

Next step is to calculate ownership/operating costs for each operation. The table was calculated using the MACHDATA.XLS spreadsheet. Costs have been recalculated to look at 200 acres of a hay crop harvested in three cuttings, covering 600 acres. It is assumed harvesters will be used on 200 acres of corn silage as well (only a portion of the ownership costs are charged to the hay crop).

The table shows which is the more limiting operation, mowing or chopping, for six equipment combinations: 1) 9' mower-conditioner and pull-type forage harvester, one swath/pass, 2) 12' mower-conditioner with same pull-type chopper, one swath/pass, 3) 12' mower-conditioner with self-propelled chopper (assuming self-propelled unit travels a little faster), 4) 14' mower-conditioner with self-propelled chopper, 5) 9' mower-conditioner and a windrow merger, allowing pull-type chopper to cover two swaths or 18'/pass, and 6) same 9-foot mower-conditioner and windrow merger, with self-propelled chopper. Obviously, there are other combinations that could be compared.

Weather and labor are assumed to permit mowing 4 hours/day and chopping 6 hours/day. The fourth

column shows chopping operation limits capacity in the first two scenarios. The self-propelled chopper has enough additional capacity to keep up with mowing in the last four scenarios.

Economists analyze tradeoffs visually by means of "efficient frontier" graphs. The graph compares days required per cutting with total machinery ownership and operating costs per year. The cheapest system is the 12' mower-conditioner with the pull-type chopper. It will cost \$5,254/year to operate and will take 10 days. Going to a 14' system with a self-propelled chopper will cut the time to 7 days, but bumps the cost to \$6,861/year. The 9' system may appear to be the cheapest; however, the extra labor adds to the cost.

The bottom line is that thinking in terms of tradeoffs, pushing a pencil, and considering slightly "outside-the-box" equipment combinations may help you identify cost-cutting and revenue-enhancing opportunities. ☘

Time Requirements/Annual Costs for Selected Haylage Mowing & Chopping Equipment Combinations (200 Acres of Haylage, 3 Cuttings)

Equipment (DRLO = Days Required for Limiting Operation)	Swath	Cost /Acre	Cost /Year	Acres /Hour	Feasible Acres/Day	DRLO
Mower-Conditioner 9'	9'	\$10.09	\$2,017	4.36	17.5	
Forage Harvester (Pickup Head) 9'	9'	\$22.06	\$4,412	2.48	14.9	
Total Cost and DRLO		\$32.15	\$6,429		14.9	13
Hay Swather-Cond 12'	12'	\$8.39	\$1,679	5.82	23.3	
Forage Harvester (Pickup Head) 12'	12'	\$17.88	\$3,575	3.31	19.9	
Total Cost and DRLO		\$26.27	\$5,254		19.9	10
Hay Swather-Cond 12'	12'	\$8.39	\$1,679	5.82	23.3	
Pickup Head for SP Harvester Base 12'	12'	\$29.02	\$5,804	4.07	24.4	
Total Cost and DRLO		\$37.41	\$7,483		23.3	9
Hay Swather-Cond 14'	14'	\$8.71	\$1,741	6.79	27.2	
Pickup Head for SP Harvester Base 14'	14'	\$25.60	\$5,120	4.75	28.5	
Total Cost and DRLO		\$34.31	\$6,861		27.2	7
Mower-Conditioner 9'	9'	\$10.09	\$2,017	4.36	17.5	
Hay Merger 9'	9'	\$7.81	\$1,562	6.11	36.7	
Forage Harvester (Pickup Head) 18'	9'	\$13.80	\$2,761	4.96	29.8	
Total Cost and DRLO		\$31.70	\$6,340		17.5	11
Mower-Conditioner 9'	9'	\$10.09	\$2,017	4.36	17.5	
Hay Merger 9'	9'	\$7.81	\$1,562	6.11	36.7	
Pickup Head for SP Harvester Base 18'	9'	\$21.09	\$4,217	6.11	36.7	
Total Cost and DRLO		\$38.98	\$7,797		17.5	11

