

TPI Formula
December 2014
Holstein Association USA

http://www.holsteinusa.com/genetic_evaluations/ss_tpi_formula.html

$$\frac{[27(\text{PTAP}) + 16(\text{PTAF}) + 3(\text{FE}) + 8(\text{PTAT}) - 1(\text{DF}) + 11(\text{UDC}) + 6(\text{FLC}) + 7(\text{PL}) - 5(\text{SCS}) + 13(\text{FI}) - 2(\text{DCE}) - 1(\text{DSB})]}{19.4 \quad 23.0 \quad 45 \quad .73 \quad 1.0 \quad .8 \quad .85 \quad 1.26 \quad .13 \quad 1.0 \quad 1.0 \quad 0.9} \times 3.8 + 2138$$

Where:

PTAP = PTA Protein	PTAF = PTA Fat
FE = Feed Efficiency	PTAT = PTA Type
DF = STA Dairy Form	UDC = Udder Composite
FLC = Feet & Legs Composite	PL = PTA Productive Life
SCS = PTA Somatic Cell Score	FI = Fertility Index
DCE = PTA Daughter Calving Ease	DSB = PTA Daughter Stillbirth

Base Change adjustment to the TPI formula:

The multiplier will stay at 3.8 and the **Constant Value** of 1832 will be **changed to 2138 to account for the Base Change.**

- Feed Efficiency = (Dollar Value of milk produced) – (Feed costs of extra milk) – (Extra maintenance costs)

Where:

Dollar Value of milk produced	= 0.0028 x PTA Milk + 1.8 x PTA Fat + 2.95 x PTA Protein
Feed costs of extra milk	= 0.0276 x PTA Milk + 0.64 x PTA Fat + 0.77 x PTA Protein
Extra maintenance costs	= 7.44 x Body Size Composite

$$\text{Body Size Composite} = (.5 \times \text{Stature}) + (.25 \times \text{Strength}) + (.15 \times \text{Body Depth}) + (.10 \times \text{Rump Width})$$

Extra maintenance costs include the increased cost of feed per lactation that is eaten by heavier cows for body maintenance based upon findings by the National Research Council plus increased housing costs minus income from heavier calf weights. Source of this information was USDA-AGIL.

- Fertility Index = 18% HCR + 18% CCR + 64% DPR

Where:

HCR	= PTA Heifer Conception Rate
CCR	= PTA Cow Conception Rate
DPR	= PTA Daughter Pregnancy Rate

Feed Efficiency will be rounded to a whole number (0 decimal places) and Fertility Index values will be rounded to one decimal place before being inputted into the TPI Calculation.