

**Jersey Performance Index**  
**Proposed Changes in the Production Type Index (PTI)**  
 Ron Pearson, PhD, Va Tech

The goals of the changes were to:

1. Maintain the basis of PTI on Commercial Profitability
2. With the increased value of decreased culling, increase the emphasis on health and durability.

These changes were not intended to be radical, but rather to reflect the economic impact of the opportunity cost of increased culling. The changes proposed are to add PL and a Functional Udder Index (FUI) to the PTI formula. Each is proposed to have an economic weight of 1.

Productive Life (PL) is the only measure to include the impact of physiological differences that are not related to milk yield and type traits on the durability of the animal. Type and production traits are not the only factors to influence the durability of the animal. Differences in reproductive traits, ability to fight disease, and other physiological traits can be extremely important in determining how long the animal is productive. The weight given PL would be increased if most Active AI bulls had more daughter information included in their proof.

The Functional Udder Index (FUI) weights the PTA for fore udder, rear udder height, udder cleft, udder depth, front teat placement, and teat length based primarily on their genetic relationship to second lactation Somatic Cell Score (Rogers et al., JDS 78:914-920). The primary intention is to use the FUI to aid in the prediction of mastitis resistance.

$$\text{FUI} = 2 * \text{FUA} + .6 * \text{RUH} + .5 * \text{UC} + 2 * \text{UD} + .5 * \text{TP} - 1 * \text{TL}$$

Index	Protein	Fat	FTI	PL	SCS	FUI	Multiplier
Current PTI	10	4	3	-	-1	-	100/16
Proposed PTI	10	4	3	1	-1	1	100/18

Year / Trait	Protein	Fat	FTI	PL	SCS	FUI	Multiplier
1992	4 (66.7) <sup>1</sup>	1 (16.7)	1 (16.7)	--	--		100/6
1994	8 (53.3)	2 (13.3)	2 (13.3)	2 (13.3)	-1 (6.7)		100/13
1998	10 (55.5)	4 (22.2)	3 (16.7)	--	-1 (5.6)		100/16
2002	10(50.0)	4(20.0)	3(15.0)	1(5.0)	-1(5.0)	1(5.0)	100/18

The weights used in the last four PTI formulations are compared in Table 1. The respective weights are multiplied times the corresponding PTA/ Standard Deviation.

AJCA Staff Summary Comments:

- Jersey Performance Index (JPI) adds Productive Life (PL) back to the index  
*Predictor of herd life*
- JPI adds a new trait - Functional Udder Index (FUI)  
*Predictor of mastitis resistance*

$$\text{FUI} = 2 * \text{Udder Depth} + 2 * \text{Fore Udder Attachment} - 1 * \text{Teat Length} + 0.6 * \text{Rear Udder Height} + 0.5 * \text{Udder Cleft} + 0.5 * \text{Teat Placement}$$

- JPI places emphasis as  
50% Protein : 20% Fat : 15% FTI : 5% PL : -5% SCS : 5% FUI
- Overall ratio of production to fitness traits is 70:30
- Emphasis on fitness traits increases from 22.3 % to 30%, with particular emphasis on udder traits through FUI and PL
- While the emphasis on FTI decreases slightly (16.7 % to 15%), increased emphasis on udder traits through the FUI and PL more than compensates.
- Proposed changes reflect an increased value on herd life through udder traits and udder health as well as reproductive measures and overall durability that decrease involuntary culling.
- Correlation (May Active AI bulls) between:

PTI and JPI	0.99
PTI and NM\$	0.96
PTI and CM\$	0.96
JPI and NM\$	0.97
JPI and CM\$	0.97

- FTI weights remain the same

**Table 2. Weights for each linear trait for calculating FTI (no changes)**

Stature	Strength	Dairy Form	Foot Angle	Rear Legs	Rump Angle	Rump Width	Fore Udder	Rear Udder Height	Rear Udder Width	Udder Depth	Udder Cleft	Teat Placement	Teat Length
-0.29	-0.22	-0.31	1.97	-0.83	-0.51	0.17	0.86	1.26	0.78	1.00	0.06	0.38	-1.37