2Herd Matrix Column Names

1: Time of simulation, t.

2: ID, unique animal number

3: Age in days, t.

4: Infection Status. 1 Susceptible (S), 2 Latent(L), 3 Low Shedder(Y1),

4 High Shedder(Y2), 5 Susceptible Calf(SC), 6 Infected Calf(IC),

7 Susceptible Heifer(SH), 8 Infected Heifer (IH)

5: Lactation Status. 0 before first insemination, 1 ready to be inseminated,

2 pregnant or calving, 3 voluntary waiting period,

6: Parity Number (0-Pmax)8

7: Parity Age

8: Pregnant Days (0-280)

9: Failed AI

10: Days in Milk, DIM

11: MAP Days

12: Milk Production (based on Smith's model under MAP)

13: Management changes, cost of interventions

14: Milk Revenue

15: Dead indicator. 1 Natural Culling for Cows (S,L,Y1,Y2); 2 Nat Cull Calves; 3 Nat Culled Heifers; 4 Open Cow Cull (AI Attempts == limit); 5 Cull if Over Maximum Parity; 6 Culled Cows if over herd limit; 7 Culled Calves if over limit; 8 Culled Heifers if over limit; 9 Voluntary Culling Cows (count towards NPV); 10 Voluntary Culling for Heifers; 11 Voluntary Culling for calves; 12 Test and Cull; 13 Test and Cull cows Tb; 14 cows over limit

Cull Cows sale: 4,5,9,

16: Gross Profit per cow/day

17: Discounted Gross Profit

18: Last Insemination day.

19: Pregnancy today? 1= yes; 0= no; 2= unsuccessful pregnancy

20: Day to cull open cows/

21: Body Weight (without the pregnant component) =BWa+BWl

22: Dry Matter Intake (Kg/Day) DMI measures feed consumed per day.

23: Feed cost per day (USD/day) multiply DMI \* Cost per Kg.

24: Non Feed Costs + Fixed Costs (including cost of AI, Pregnancy diagnostics, etc) Total cost per animal is sum(23:24)

25: Milk Revenue – Total Cost per animal (Net Profit Nominal, feed and nonfeed costs)

26: Discounted Milk Net Profit per animal per day (using function of BW, DMI)

27: Test Result (Elisa of FC): S,L, Y1, Y2.

28: Number of Tests

29: Culling Date after FC Test, or any other criteria

30: Milk Production Genetics

31: indicator that cow needs to be culled, do not AI. Cull after lactation or calving, if pregnant.

32: Test results day (FC test)

33: ID of last Calf

Tb

34: Days in Current TB Infection

35: CFT, CFT+CTT Test Positive? 1/0

36: Post Mortem Test Positive, histology and Culture? 1/0

37: TbStatus of the Remaining Animals (alive) After Test and Cull (animals left in herd that did not test positive (col. 35))

41: ID of the Mother

42: cows feeding group (separate by dry 1, early 2, mid 3, and late 4 lactation)

43: Tb Infection Status.

COWS 1: Susceptible (STb); 2: Occult (OTb); 3: Reactive (RTb); 4: Infectious (ITb);

CALVES 5: Suscept. (CSTb); 6: Occult (COTb); 7: Reactive (CRTb); 8: Infectious (CITb).

HEIFERS 9: Suscept. (HSTb); 10: Occult (HOTb); 11: Reactive (HRTb); 12: Infectious (HITb).

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NPV Matrix:

1: NPV of Milk Gross Profit

2: NPV of selling Culled Cows

3: NPV of selling male calves

4: NPV of Female culled calves

5: Sum of NPV(1:4) Gross Profit of milk production, selling cows and calves

6: NPV of Intervention and Managerial Change Expenses (Tb Tests, Vet costs)

7: Net NPV!

WHTTrigger: (Whole Herd Test, for TB)

1: Time of WHT since Starting simulation

2: Phase: 1 Removal, 2 Verification, 3 Assurance

3: Positive Tb Results (1/0)Always 1

4: Num Positive Tested Tb animals

5: Num True Positive Tb animals Detected (Postmortem results)

6: Num True bTB (ORI)animals remaining in Herd (O+R+I) Adult and Calves

7: Num Adult Occult remaining in herd

8: Num Adult Reactive

9: Num Adult Infected

10:Num Calves Occult

11:Num Calves Reactive + Infective

Results:

1: DeathTotal

2: Total Dead Animals at end of simulation

3: TotalLiveAnimals at end of simulation

Number at end of simulation of:

4: Total Animals (alive)

5: Susceptible

6: Latent

7: Low Shedders

8: High Shedders

9: Calves Susceptible

10: Calves Infected

11: Heifers Susceptible

12: Heifers Infected

13: Death Total

14: Total Live Animals

15:

16: NPV Milk Production

17: NPV (Sales) Culled Cows

18: NPV (Sales) Male Calves Sold

19: NPV (Sales) Female Calves Sold that are over limit

21: NPV Total Herd

22: Expenses (Managerial)

23: Total NPV, excluding Salvage value

24: NPV Salvage Value (year 21)

25: Total NPV (including Salvage Value)

26: Number of Susceptible. S, t=1.

27: Latent, L t=1

28: Low Shedder, Y1, t=1

29: High Shedder, Y2, t=1

30: Susceptible, S, t=end

31: Latent, L, t=end

32: Low Shedder, Y1, t=end

33: High Shedder, Y2, t=end

23: Day of first Tb positive (from postmortem test)

24: Number of Tb infected (True) (Occult, Reactive, and Infectious) animals (adult and calves) remaining in the herd, at time of detection.

25: Day of Tb infection, (free of any type of Tb)

26: Number of total WHT to reach 0 Tb infection

27: Number of Total WHT performed

28: Number of WHT to eradicate bTB after first negative Postmortem Test (enhanced)

29: Maximum length of consecutive negative WHT before eradicating bTB

30: Day of last WHT

Population Dynamics.

NewAnimals:

1: New Calves

2: New Heifers

3: New Cows

DeadCows:

1: Natural Culled Cows

2: Open Cow Culled (AI attempts==Limit)

3: Over Parity Culled

4: Over Cow Number Limit Culled

5: All Dead Cows

DeadAnimals:

1: Natural Culled Cows %

2: Natural Culled Calves %

3: Natural Culled Heifers %

4: Max AI Attempt (Open Cows) %

5: Over Parity %

6: Low Milk Production/ over limit cows %

7: Voluntary Culled Female Calves (over limit)

8: Heifers for Sale

9: Voluntary Culled Cows %

10: Voluntary Culled Calves %

11: Voluntary Culled Heifers %

12: Test and Cull Cows (MAP)

13: Test and Cull Tb positive Animals

14: Over Limit Cows

bTBStatus:

1: number of Infected (bTB= I),

2: number of newly infected in that day