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# dairy.js

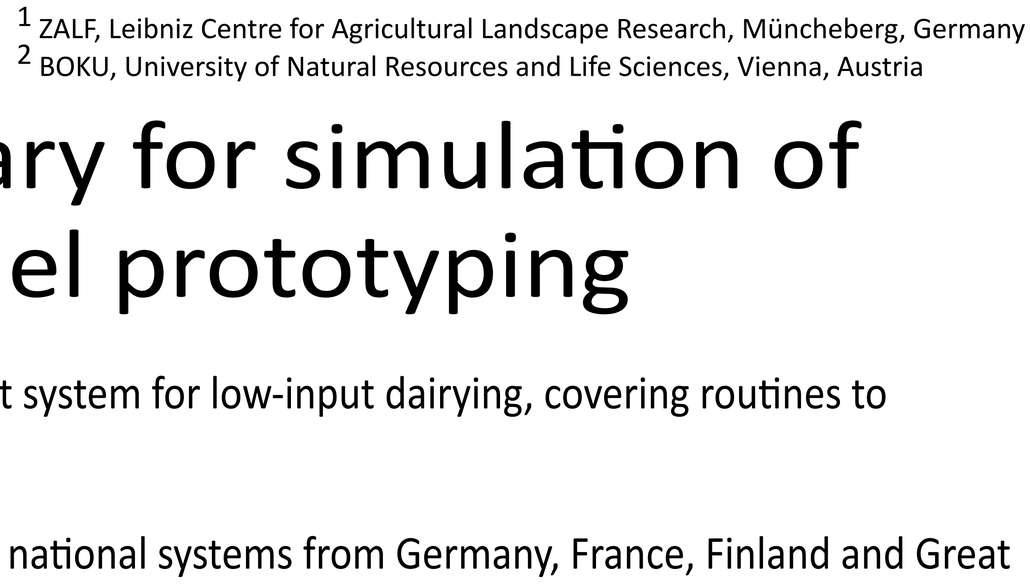
# An open-source JavaScript library for simulation of dairy cow herds and rapid model prototyping

dairy.js is a JavaScript library developed as part of SOLID-DSS, a decision support system for low-input dairying, covering routines to simulate dairy cow herds and young stock:

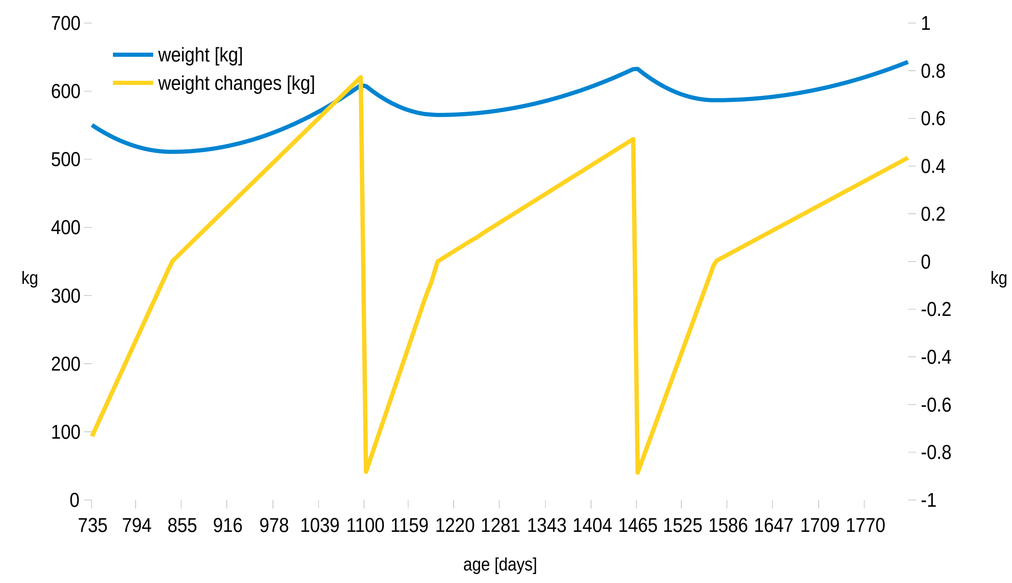
Milk yield and milk solids, requirements and feed evaluation (both expressed in national systems from Germany, France, Finland and Great Britain), intake (INRA), growth and mobilization, grouping, herd structure and ration optimization (MILP/LP). Additionally some utility tools for curve fitting (lmfit.js) and MILP solving (glpk.js) are available.

Potential use cases range from simulation, web-based decision support, rapid model prototyping or scientific modeling. The complete code base is hosted on GitHub (github.com/jvail/dairy.js) under MIT license. A few examples below:

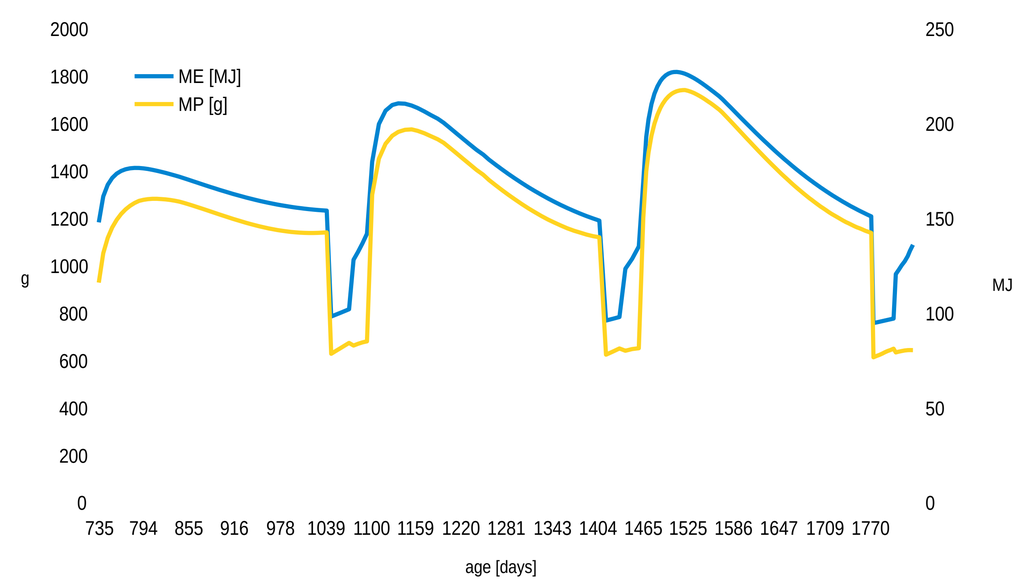
```
/* milk yield and solids vs age in days from parity one to three */

cow.milk = dairy.milk.milk(
    wood.milk_a, wood.milk_b, wood.c,
    cow.weekInMilk, cow.parity, scale
);

cow.weekMilkPeak = dairy.milk.d_mx(wood.a, wood.b, cow.P) / 7;
cow.milkFat = dairy.milk.fat(
    wood.fat_a, cow.weekInMilk, cow.parity, cow.weekMilkPeak
);

cow.milkProtein = dairy.milk.protein(
    wood.protein_a, cow.weekInMilk, cow.parity, cow.weekMilkPeak
);
```



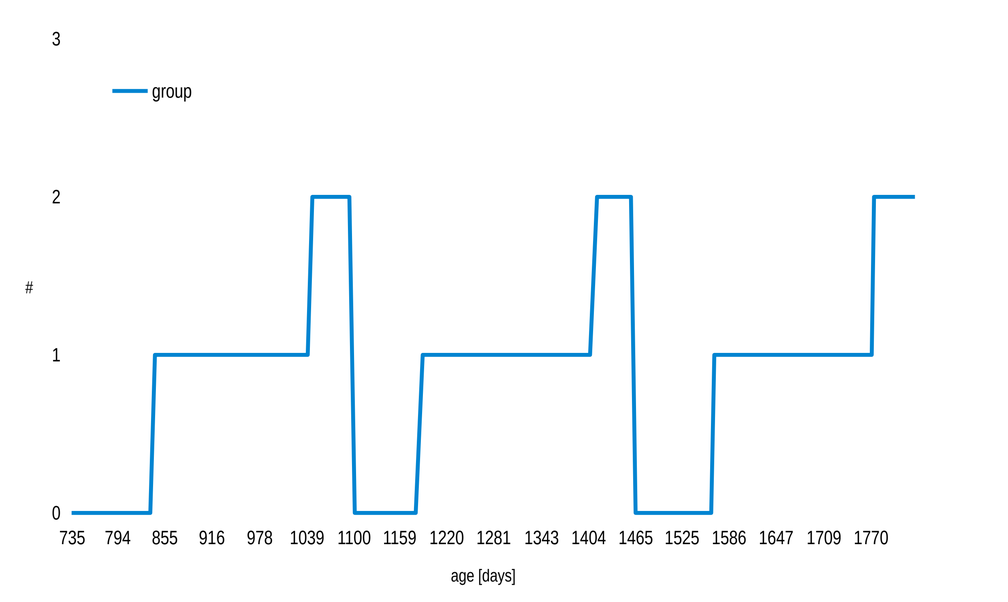

```
/* body weight and mobilization vs age in days for a dual-purpose
cow from parity one to three */

cow.bodyWeight = dairy.body.weight(
    cow.daysPostPartum, cow.dayMaxMilk, cow.age, calvingInterval,
    matureBodyWeight, ageFirstCalving, weightAtBirth,
    weightAtFirstCalving, 'dual'
);

cow.bodyWeightChange = dairy.body.weightChange(
    cow.daysPostPartum, cow.dayMaxMilk, cow.age, calvingInterval,
    matureBodyWeight, ageFirstCalving, weightAtBirth,
    weightAtFirstCalving, 'dual'
);
```




```
/* requirements (GB) vs age in days from parity one to three */

dairy.requirements.gb.main(
    cow.bodyWeight, cow.intake, ME_total, forageProportionInDiet
);

dairy.requirements.gb.prod(cow.milk, cow.fat, cow.protein);
dairy.requirements.gb.gest(cow.weekGestation, matureBodyWeight);
dairy.requirements.gb.weit(cow.bodyWeightChange);

dairy.requirements.gb.actv(
    cow.bodyWeight, pastureProportion,
    horizontalDistance, verticalDistance
);
```




```
/* grouping of cows by minimizing variance of energy and protein
requirements within groups */

/* k-means options */
var options = {
      k: noGroups
    , runs: 15
    , normalize: true
};

dairy.group.get(cows, options);
```




SOLID | Sustainable Organic and Low Input Dairying

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Hosted on GitHub