ANACLI e ARA VENETO incontrano gli Allevatori

Limousine e Charolaise Italiane: la genetica per una zootecnia sostenibile nell'ambito del PSRN

Giovedì 7 aprile 2022, ore 11,00
ARAV Sala Assemblee
Viale Leonardo da Vinci, 52 – VICENZA

Programma

Saluti
- Floriano DE FRANCESCHI (Presidente ARA Veneto)

Introduzione ai lavori
- Malko GALLONE (Presidente ANACLI)

Interventi
- Dott. Stefano Saleppichi (Direttore ANACLI) - Il libro Genealogico delle razze Charolaise e Limousine Italiane
- Prof. Riccardo BOZZI (DAGRI – UNIFI) - Limousine e Charolaise: attività di miglioramento genetico nell'ambito dei progetti I-BEEF 1 e 2
- Prof. Massimo De Marchi (DAFNAE – UniPD) - Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Discussione

UNIONE EUROPEA
Fondo agricolo per lo sviluppo rurale
L'Europa investe nelle zone rurali

PROGETTO I – BEEF 2
PSRN 2020 – 2023
Sottomisura 10.2: Biodiversità animale

Autorità di gestione: Direzione Generale dello Sviluppo Rurale del Ministero delle Politiche Agricole Alimentari e Forestali (MIPAAF)

UNIVERSITÀ DEGLI STUDI FIRENZE
DAGRI
DIPARTIMENTO DI SCIENZE E TECNOLOGIE AGRARIE, ALIMENTARI, AMBIENTALI E FORESTALI

I-Beef2
Italian Beef
Environmental Efficiency and Fitness 2

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Prof. Massimo De Marchi

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

- Benessere e salute animali
  - Svezzamento (separazione vitello dalla madre)
  - Trasporto
  - Allevamento (condizioni ambientali, spazi, condizioni di alimentazione, relazioni sociali, …)
- Sostenibilità ambientale
- Antibiotico resistenza
- Costi di produzione
- Valorizzazione del prodotto nel mercato
- …

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

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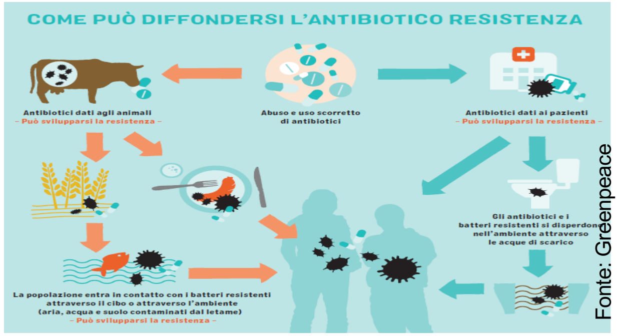
- …

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Antibiotico resistenza: che cos'è?

E' l'abilità di batteri patogeni di resistere all'azione degli antibiotici che di regola eliminano questi microrganismi (WHO,2017)



Antibiotico resistenza: perché è una minaccia?

Le malattie dovute a batteri resistenti non possono essere trattate con gli antibiotici ai quali questi sono resistenti ne in ambito umano che zootecnico

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Antibiotico resistenza: potenziali strategie

1. Management strategies
(McDougall et al., 2009; Kil& Stein, 2010; Trevisi et al. 2014; Postma et al., 2015)
   - Biosecurity & good hygiene (Laanen et al., 2013)
   - Vaccination programmes (Potter et al. 2008)
   - Housing & Facilities

2. Feeding strategies
(Thacker et al., 2013 ; Allen et al., 2013)
   - Clay minerals (Slamova et al., 2011)
   - Essential oils (Omonjio et al., 2018)
   - Pre- & probiotics (Gaggia et al., 2010; Soccol et al., 2010)

3. Sviluppo di Monitoring & Survaillance systems
(Merle et al.2012; Schrijver et al., 2018)

4. Uso di tecnologie (ex. PLF) (Vidic et al., 2017; Tullo et al., 2019)

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Antibiotico resistenza: cosa possiamo fare?

- Approccio 'One Health'
  - Riconosce che la salute dell'uomo, degli animali e dell'ambiente sono interconnesse
  - Molti microrganismi infettano animali e uomo in quanto condividono l'ecosistema in cui vivono

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Antibiotico resistenza: cosa possiamo fare?

- Vaccinare gli animali per ridurre il bisogno di usare AB
- Promuovere 'good practices' durante tutte le fasi allevamento
- Somministrare AB agli animali solo per trattare e controllare malattie infettive e sotto controllo del veterinario
- Adottare sistemi sostenibili tenendo conto di biosicurezza, igiene e stress-free handling degli animali
- Implementare standards e linee guida internazionali per un uso responsabile degli AB
- Migliorare la sorveglianza dell'uso di AB in medicina veterinaria
- Promuovere la ricerca e l'innovazione
- Migliorare la comunicazione, educazione e formazione

www.who.int/drugresistance
www.oie.int/antimicrobial-resistance
www.fao.org/antimicrobial-resistance
#AntibioticResistance
Food and Agriculture Organization of the United Nations
OIE World Organisation for Animal Health
World Health Organization

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Utilizzo del AB nel vitellone da carne:

- TI100 - comprende tutte le tipologie di AB usati negli allevamenti
- HPCIA - comprende AB riconosciuti a livello internazionale come quelli che contribuiscono maggiormente allo sviluppo dell'antibiotico-resistenza (cefalosporine, macrolidi e quinoloni) e che quindi dovrebbero essere eliminati o usati solo se strettamente necessari (WHO, 2017)

I DATI DISPONIBILI DICONO CHE...

Attraverso il progetto «AntibioticFreeBeef», finanziato dal PSRdella Regione Veneto e finalizzato a sviluppare metodologie innovative necessarie a ricercare una soluzione al problema dell'utilizzo degli antibiotici nell'allevamento del bovino da carne, è stato possibile ottenere risultati interessanti. La collaborazione tra l'Università di Padova, l'Istituto zooprofilattico sperimentale della Lombardia e dell'Emilia-Romagna, l'Istituto zooprofilattico sperimentale delle venezie e l'Associazione zootecnica veneta (AZoVe) ha permesso di ottenere informazioni

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

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ELSEVIER

Use of antimicrobials in beef cattle: an observational study in the north of Italy

Alessia Diana[a], Matteo Santinello[a], Mauro Penasa[a], Federico Scali[b], Edoardo Magni[b], Giovanni Loris Alborali[b], Luigi Bertocchi[b], Massimo De Marchi[a,*]

[a] *Department of Agronomy, Food, Natural resources, Animals and Environment (DAFNAE), University of Padova, Viale dell'Università 16, 35020 Legnaro, PD, Italy*
[b] *Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna 'Bruno Ubertini' (IZSLER), Sector Diagnostic and Animal Health, Via Bianchi 9, 25124 Brescia, Italy*

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ABSTRACT

Antimicrobial resistance is a worldwide issue whereby a more prudent use of medications is needed, especially for those antimicrobials (AM) classified as 'highest priority critically important antimicrobials' (HPCIAs) which are likely contributors to the development of resistance. So far, data on antimicrobial use (AMU) in EU are mainly reported at sales level while information on real use, mostly in beef production, is poor. The most reliable indicator to measure AMU is the treatment incidence (TI100) calculated by using the Defined Daily Dose Animal (DDDA) as stated by the European Medicines Agency (EMA). Although Italy ranks second among EU countries with regard to the AM sales in livestock production, data on AMU of the Italian beef production is still lacking, whereby the aim of this study was to provide information on the current scenario of AMU in Italian beef cattle. Data were collected from January 2016 to April 2019 from specialized beef fattening farms located in the north of Italy yielding a final dataset of 1376 batches. Data on performance and AM agents used in the study were collected and TI100 indexes per batch were calculated according to both Italian and EMA's DDDA. A Kruskal-Wallis test was used to check for differences between years and seasons. Results showed a significant variation between years and seasons with a reduction of TI100 based on Italian DDDA as time progressed ($P < 0.05$). However, about 40% of the total amount of treatments administered were HPCIAs with macrolides accounting for the 27.7% of the total amount. The most common reasons of administration of AM were respiratory diseases (68.9%) and lameness (17.6%). Penicillins was the class of AM used on the highest proportion of batches (84.4%) showing that broad-spectrum AM were widely exploited among herds. In summary, despite a general reduction of AMU in beef cattle over time, a great use of HPCIAs was still observed suggesting that AM stewardship for Italian beef production should pay particular emphasis on the reduction of HPCIAs use. This shows how overall knowledge on where efforts need to be optimized is important to develop targeted strategies for a more responsible AM stewardship. Results of the current study may also contribute to define national and EU benchmark criteria for AMU, as a comparison with studies carried out in other countries or on other food-producing sectors is still challenging to achieve.

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

2.3. *Calculation of the treatment incidence 100*

Data organised by batches were used to calculate an index called treatment incidence 100 for Italy (TI100it) which quantifies the frequency of treatments using the DDDAit as a metric. This index is more consistent to the measurement system used in human medicine (Grave et al., 1999; Timmerman et al., 2006) and the value obtained (e.g. 15) can be explained as: 1) the number of animals treated (i.e. 15) every 100 heads; 2) the number of days (i.e. 15) of treatment every 100 days of production and 3) the percentage of time (i.e. 15%) animals spent under treatment during their entire production cycle (AACTING, 2019). The following formula (1) was used to calculate the TI100it per each AM agent (modified from Timmerman et al., 2006; Pardon et al., 2012; AACTING, 2019):

$$\text{TI100 it} = \frac{\text{amount of AI used per batch (mg)}}{\text{DDDAit (mg/kg/day)} \times \text{animals a t risk} \times \text{standard weight (kg)} \times \text{days at risk}} \times 100 \quad (1)$$

where 'animals at risk' identified the total number of animals of the batch; 'standard weight' was the estimated BW at treatment of livestock (400 kg); 'days at risk' were the standard number of days of the fattening cycle (230 days).

In addition to the TI100it calculated using DDDAit, a second TI100 (TI100vet) was defined using the same formula but with EMA's DDDvet (EMA (European Medicines Agency), 2016) instead of DDDAit. The

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Table 2
Number and percentage of batches which were treated at least once with one of the listed AM classes, and descriptive statistics of the number, percentage, median and interquartile range (IQR) of treatments administered per batch for each class of AM on 1376 batches.

	Batches		N Treatments			
Antimicrobial class	N	%	N	%	Median	IQR
Cephalosporins (III and IV gen.)	387	28.1	6,073	3.3	8	4 - 16
Quinolones	909	66.1	15,951	8.8	11	5 - 22
Macrolides	792	57.6	50,269	27.7	52	25 - 90
Tetracyclines	561	40.8	10,616	5.9	9	4 - 23
Aminoglycosides	453	32.9	38,556	21.3	55	12 - 121
Sulfonamides	508	36.9	5,127	2.8	5	3 - 11
Amphenicol	880	64.0	20,118	11.1	13	5 - 29
Penicillins	1162	84.4	28,201	15.5	16	6 - 32
Lincosamides andaminocyclitoles	342	24.9	6,528	3.6	7	3 - 16

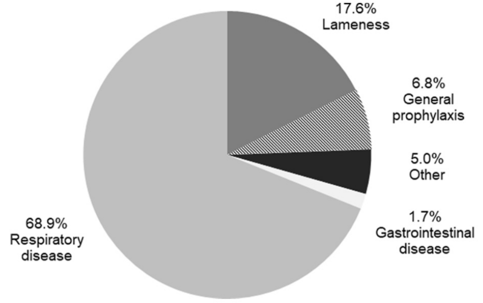

Fig. 4. Percentage of AM treatments (100% = 181,439 treatments) provided to beef cattle according to the reason of administration (n = 14 reasons) from data collected on 1376 batches.

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

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Animal
The international journal of animal biosciences

Exploring potential risk factors of antimicrobial use in beef cattle

A. Diana [a], M. Penasa [a], M. Santinello [a], F. Scali [b], E. Magni [b], G.L. Alborali [b], L. Bertocchi [b], M. De Marchi [a,*]

[a] *Department of Agronomy, Food, Natural resources, Animals and Environment (DAFNAE), University of Padova, Viale dell'Università 16, 35020 Legnaro (PD), Italy*
[b] *Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna 'Bruno Ubertini' (IZSLER), Sector Diagnostic and Animal Health, Via Bianchi 9, 25124 Brescia, Italy*

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ABSTRACT

Livestock species are major contributors to the increase of antimicrobial (**AM**) resistance which is a worldwide concern for both human and animal health. The over-use of AM is widely acknowledged, however, unlike pigs, poultry and dairy cattle, knowledge on potential risk factors affecting AM usage (**AMU**) in beef industry is limited. Hence, this study aimed to investigate the impact of farm, breed, sex and season of arrival of purchased beef cattle on AMU in Italian beef cattle. Data on 1063 batches were collected from January 2016 to April 2019 from specialised beef fattening farms located in the north of Italy. Information on breed, sex, date of arrival, performance traits and AM agents used on farm was collected, and the treatment incidence 100 (**TI100**) indexes per batch were calculated using the defined daily dose animal estimated according to Italian summaries of product characteristics. Factors affecting TI100 indexes were investigated using a cross-classified multilevel model. Farms largely differed in terms of AMU. Males had greater AMU than females ($P < 0.001$), likely due to their higher susceptibility to disease. Statistically significant differences were observed between seasons of arrival with summer and spring having lower TI100 indexes than winter and autumn ($P < 0.001$). Indeed, winter is commonly linked to an increase in respiratory diseases in beef cattle. Finally, the TI100it indexes tended to be different among breeds with Blonde d'Aquitaine and Limousine having greater AMU compared to the other breeds. Results of this study provided valuable information on potential risk factors of AMU in beef production which may be useful to address its reduction. For instance, the development of tailored management strategies for specific breeds, targeted approaches to improve the health of males as well as greater care towards batches purchased in winter are possible advice to implement on-farm for a more responsible AM stewardship.

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Table 3
Estimates and SE of breed[1] and farm for treatment incidence 100 (TI100) indexes[2] obtained from the batches of beef cattle included in the final analysis ($n = 1063$).

		TI100it		*P*-values	HPCIA TI100it		*P*-values
		Estimate	SE		Estimate	SE	
Breed				= 0.06			= 0.08
	Intercept	0.129	0.086		0.252	0.181	
	BDA	0.412^	0.222		0.433	0.361	
	CHR	0.076	0.163		0.216	0.241	
	FRC	−0.026	0.177		−0.014	0.256	
	IRC	−0.152	0.204		−0.586^	0.336	
	ITC	−0.637*	0.186		−0.674*	0.272	
	LIM	0.277^	0.169		0.526*	0.253	
Farm				= 0.002			= 0.006
	Intercept	0.138	0.047		0.235	0.094	
	F1	0.268*	0.131		−0.282	0.220	
	F2	−0.559*	0.193		−0.563*	0.288	
	F3	−0.199	0.125		−0.317	0.223	
	F4	0.193	0.138		0.362	0.239	
	F5	0.173	0.157		0.475*	0.245	
	F6	0.251^	0.134		0.452*	0.215	
	F7	−0.408*	0.130		−0.337	0.263	
	F8	0.143	0.150		0.299	0.258	
	F9	−0.258	0.195		−0.063	0.276	
	F10	−0.465*	0.123		−0.504*	0.261	
	F11	0.245^	0.133		−0.083	0.241	
	F12	0.246	0.157		−0.527^	0.306	
	F13	0.036	0.222		−0.515	0.352	
	F14	0.052	0.149		−0.049	0.251	
	F15	0.311*	0.125		0.582*	0.226	
	F16	0.611*	0.123		0.883*	0.225	
	F17	−0.595*	0.189		−0.190	0.304	
	F18	−0.261*	0.128		0.041	0.248	
	F19	−0.049	0.120		−0.126	0.209	
	F20	−0.615*	0.171		−0.427	0.292	
	F21	0.072	0.135		−0.187	0.247	
	F22	−0.049	0.288		0.196	0.385	
	F23	−0.117	0.109		−0.258	0.216	
	F24	0.476*	0.244		0.675*	0.332	
	F25	0.449*	0.143		0.372	0.239	

Statistically different from the intercept = $^*P < 0.05$; $^\wedge 0.10 < P < 0.05$.
[1] BDA = Blonde d'Aquitaine, CHR = Charolaise, FRC = French crossbred, IRC = Irish crossbred, ITC = Italian crossbred, LIM = Limousine.
[2] TI100it = treatment incidence 100 for Italy, calculated using the defined daily dose

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Table 5
Least squares means (LS mean) and SE of sex, season of arrival of purchased beef cattle and year, and regression coefficient and SE of initial BW (kg) for treatment incidence 100 (TI100) indexes[1] obtained from the batches of beef cattle included in the final analysis ($n = 1063$).

		TI100it		HPCIA TI100it		*P*-values
		LS mean	SE	LS mean	SE	
Sex						<0.001
	Female	1.07[a]	0.20	0.53[a]	0.14	
	Male	2.01[b]	0.35	1.07[b]	0.27	
Season						<0.001
	Winter	1.82[a]	0.32	0.95[a]	0.24	
	Autumn	1.95[a]	0.35	1.08[a]	0.27	
	Spring	1.16[b]	0.21	0.53[b]	0.14	
	Summer	1.13[b]	0.20	0.59[b]	0.15	
Year						<0.05
	2016	1.56[a]	0.28	0.85[a]	0.22	
	2017	1.50[a]	0.27	0.70[b]	0.18	
	2018	1.35[b]	0.24	0.72[b]	0.18	
Initial BW (kg)^		$-0.002 \pm 0.001^*$		$-0.003 \pm 0.001^*$		<0.05

[a,b]Different superscripts within trait and effect differ significantly from each other ($P < 0.05$).
^Results for continuous covariate presented as regression coefficient ± SE; $^*P < 0.05$.
[1] TI100it = treatment incidence 100 for Italy, calculated using the defined daily dose

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

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Effect of welfare standards and biosecurity practices on antimicrobial use in beef cattle

Alessia Diana[1]✉, Valentina Lorenzi[2], Mauro Penasa[1], Edoardo Magni[2], Giovanni L. Alborali[2], Luigi Bertocchi[2] & Massimo De Marchi[1]

Antimicrobial use (AMU) in livestock species and the associated antimicrobial resistance are a global concern, thus strategies for their reduction and a more judicious use are needed. Previous research has revealed a link between improved animal welfare, biosecurity and AMU reduction in pig and dairy sectors, however, little is known about the beef sector. This study aimed to investigate the impact of welfare standards and biosecurity on AMU in beef cattle. Data on performance traits and AMU were collected over a 3.5 year time from 27 specialised beef farms and a treatment incidence was calculated using the defined daily dose for animals. An on-farm assessment was carried out by assigning a score from 0 (very poor) to 100% (very good) to 3 sections: welfare, biosecurity and emergency management. The highest average score was obtained for the welfare section (76%) followed by emergency management (39%) and biosecurity (24%). This suggests that major focus on strategies for the implementation of biosecurity measures and emergency management is needed, due to the low scores reported. A statistically significant lower AMU was observed with improved level of welfare. These results may be helpful for farm benchmarking and highlight the importance of improved animal welfare for an efficient antimicrobial stewardship.

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Effect	Category	TI100it		TI100vet		HPCIA TI100it		HPCIA TI100vet	
		LSM	SEM	LSM	SEM	LSM	SEM	LSM	SEM
Total welfare[2]	Low (<60%)	NA	NA	NA	NA	NA	NA	NA	NA
	Medium (60% to 80%)	1.61[a]	0.45	1.28[a]	0.42	0.98[a]	0.34	0.89[a]	0.37
	High (>80%)	1.25[b]	0.35	1.02[b]	0.34	0.81[a]	0.28	0.75[a]	0.32

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

Article

Promoting Judicious Antimicrobial Use in Beef Production: The Role of Quarantine

Matteo Santinello [1,*], Alessia Diana [1], Massimo De Marchi [1], Federico Scali [2], Luigi Bertocchi [3], Valentina Lorenzi [3], Giovanni Loris Alborali [2] and Mauro Penasa [1]

1. Department of Agronomy, Food, Natural Resources, Animals and Environment (DAFNAE), University of Padova, 35020 Legnaro, VEN, Italy; alessiadiana84@gmail.com (A.D.); massimo.demarchi@unipd.it (M.D.M.); mauro.penasa@unipd.it (M.P.)
2. Sector Diagnostic and Animal Health, Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna 'Bruno Ubertini' (IZSLER), 25124 Brescia, LOM, Italy; federico.scali@yahoo.it (F.S.); giovanni.alborali@izsler.it (G.L.A.)
3. Italian National Reference Center for Animal Welfare (CReNBA), Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna 'Bruno Ubertini' (IZSLER), 25124 Brescia, LOM, Italy; luigi.bertocchi@izsler.it (L.B.); valentina.lorenzi@izsler.it (V.L.)

* Correspondence: matteo.santinello@phd.unipd.it; Tel.: +39-34-0112-9081

Simple Summary: The development of cost-effective strategies that can be easily implemented on-farms is pivotal to promote a more judicious use of antimicrobials and its reduction in livestock industry. Indeed, inappropriate use of antimicrobials is linked to the phenomenon of antimicrobial resistance, a global health concern for both humans and animals. Studies on other food-producing species have confirmed the effectiveness of biosecurity measures on the reduction of antimicrobials, of while little is still known in beef production. Thus, this study aimed to investigate the effect of quarantine as a strategy to reduce medications in beef production. This measure resulted to be a viable strategy to reduce antimicrobials in beef cattle without compromising animal health and performance. The reduction was evident especially with regards to treatments administered for

Valutazione ed individuazione di caratteri di resistenza genetica alle malattie

- Attività 7.1 Fonti dei dati e analisi statistica preliminare dei database integrati (Mesi 6-24)
  - >20 aziende di razza Charolaise e Limousine (questionario aziendale)
  - informazioni sulla performance degli animali (anagrafica, pesi, infortuni, ecc.)
  - informazioni sull'uso di antibiotico
- Attività 7.2 Calcolo defined daily doses (DDD) e Treatment incidence (TI100) (mesi 12-36)
- Attività 7.3 Relazioni tra Indice di trattamento TIx100 e indici genetici ANACLI (mesi 24-36)

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Limousine e Charolaise Italiane: la genetica per una zootecnia sostenibile nell'ambito del PSRN

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Programma

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Introduzione ai lavori

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Discussione

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Environmental Efficiency and Fitness 2

Prof. Massimo De Marchi
massimo.demarchi@unipd.it

1222·2022 800 ANNI
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