We thank the reviewer for the concise review and the remarks which we found to the point. We address the mentioned items one by one:

1) P4L5: from the detailed description in Methods, M is not an 'intensive' mowing.
We see the point and exchange 'intensive' by 'regular' (P4L6).

2) P5L9: It might be better to cite original reference for the pasture area.
Fader et al. (2010) modified the underlying dataset by Portmann et al. (2010) so that we changed the sentence (P5L9) to
'as weights which was derived by Fader et al. (2010) by modifying the dataset of Portmann et al. (2010)'.

3) P6L26: LPJmL3.5 is not mentioned before. Either give a reference or a web link.
We introduce the version before implementing the grassland options at P5L13 with
'We refer to the current status of the model prior to the implementation of managed grasslands as LPJmL3.5.'

4) P8L14: small ruminants
We changed 'smaller' to 'small' in P8L15.

5) P8L15: It still be necessary to define or mention where the combination management to be used. For example, rangeland may not be mown in most regions.
We included this aspect by changing the sentence P8L17:
'While most rangelands are not cut at all, grasslands can be grazed by high livestock densities for short time periods but rarely mowed.'

6) P8L24-26: the description here is not the same as in Sec. 1.2.
With the implementation of the grassland options, we also changed the former default option which is now mentioned at P8L26 by writing
'Under the improved harvest scheme'.

7) P9L3: Vegetated period could be much shorter than 1 year, which makes harvest may be failed in non-growing season? I am not convinced that option M is a good/typical management schemes. But it might be useful to represent in the future a combination of mowing+grazing.
We adapted the description of this option to better motivate the current version. Indeed, there is room for development for this option which could be linked to local conditions. Now the description on P9L4 states:
'The mowing option *M* represents a regime with several mowing events per year. This option may be adjusted to local conditions by scheduling these events to certain dates or according to climatic conditions. For the global application, two harvest events per year are scheduled six months apart with one event on June 1st and another one on December 1st. In so doing, the mowing option is identical on both hemispheres but can fail for events not within the growing period.'

8) P10L16: Is there a fixed fraction in the model for the carbon to animal and mineralized?
We only regard the partition of harvested carbon between the soil and the rest and added the sentence on P10L20:
'We do not distinguish the portions of the grazed carbon that is going to animals or to mineralization.'

9) P11L14: Why use 390-year spinup?

The second spinup phase using the historical landuse development should ensure a near-equilibrium status for the transient run from 1901. The specific value of 390 years is derived from experience. We add the sentence on P11L17:
'Nearly twice the length of the landuse history of 200 years from 1700 to 1900 is needed to achieve consistent starting conditions for the transient simulations after the dynamic soil carbon equilibrium under potential natural vegetation has been disturbed.'

10) P11L27: why use 1998-2002 rather than usually used long-term mean? Please specify the reason.

For this analysis we wanted to see climate related responses and averaging over longer periods would rather reflect the effects of other drivers than weather. We specify this with the insertion on P11L30 of
'representing a medium-range period that reflects weather-related phenomena without relying on single years.'

11) P12L9: harvest here is a little confusing. May think about change a word. biomass use potential?

We agree that the word 'biomass use' fits the purpose better and exchanged it on P12L12, P1213 and P12L16 and in section 3.3.

12) P13L23: Here savanna is used. Does it fit the classification of Koppen classification? As mentioned by Reviewer 1, I cannot find the rationales behind this climate classification. It is not as mentioned in the response can help explain 'motivated by the values in the climate response figures', because the difference response to management did not well locate in the bioclimatic regions defined here.

We see that the use of biome classifications are not adequate here. The purpose of the figures was to better describe the influence of the climatic conditions. We did not refer to the Köppen-Geiger classification which distinguishes between different seasonal developments because this cannot be illustrated in the way we intended to do. The classification within the figures was chosen after analysis of the results and has no connection to other classification schemes. Therefore, we removed any biome reference and restrict the description on the temperature range and humidity or aridity. The sentence on P14L1 is changed to:
'Arid and moderately warm regions (T_A above 15°C and P_A below 500 mm) are characterized by low NPP (< 200 gC m^{-2} a^{-1}) and grass yield (33 ± 36 gC m^{-2} a^{-1}) which corresponds to 46 % of the NPP.'

13) P13L27: It is a little hard to believe 72% of NPP is harvested (include belowground NPP?) given the curve in Fig. 1.

The interaction of medium growth and high leaf biomass over a long vegetation period can indeed derive these high percentages. When the daily biomass increment by NPP is in the order of the harvested leaf fraction shown in figure 1 over the entire year, even higher percentages of the NPP could be harvested. We try to motivate this result by including the sentence on P14L4:
'This can be the case when the biomass increment by NPP is similar to the harvested biomass for a longer time period.'

14) P15L5: If the exponentially grow is due to lr, it would be necessary to explain other factors that should affect the regrowth such as nutrient limitation.

For this feedback, the ratio lr does not play a role. Under the conditions mentioned here, the growth relative to the leaf carbon increases and - even more important – the maintenance respiration decreases so that the relative growth becomes higher. We include the sentence on P15L14:

'The moderate reduction in leaf carbon still ensures high productivity while reducing maintenance respiration so that the net increase in carbon grows overproportionally.'

15) P16L2: It seems not 'below' 500 in Fig 5.

Indeed, the separation of the regions does not meet the description so that we exchanged the value 500 with 800 mm a^{-1} on P16L1.

16) P16L11: 3.5 is not slightly higher in mean.

Yes, we removed the word 'slightly' on P16L10.

17) P16L16: in previous similar presentation, 100 gC was used. Might be better to stick to it.

We see the point and adjusted the values on P16L14-15 and also on P19L4.

18) P19L4-5: It may be necessary to explain this ratio under the context of turnover time of soil, since mowing/grazing only affect biomass input into the soil.

Actually, the export of carbon via harvest as well as the additional flux into the soil play a role for the difference in the accumulation in the soil between the mowing and grazing options. We add 2 sentences on P19L7 including the values for the grazing option without livestock to illustrate the natural accumulation background without the additional flux into the soil:

'In comparison to the mowing options *D* and *M*, the loss of carbon from the system by harvest is reduced so that the transfer of NPP into the soil leads to a higher accumulation in the soil per NPP. In the case of a livestock density of 0 LSU ha^{-1}, i.e. neither export of carbon via harvest nor additional transfer into the soil via manure, the accumulation results in 1560 gC per 100 gC NPP.'

19) P20L20-21: this sentence is hard to understand.

We see the point and try to clarify by including 2 shorter sentences on P21L3:

'Grass harvest shows similar spatial patterns for both grazing options (compare Fig.A4 a and A3 a). Nevertheless, for option G_R the required demand of grass harvest for the given livestock density is met on 42 % of the pasture area whereas the demand is met at 67 % of the area for option G_D.'

20) P25L4: 'animals are not only fed with grass' It is the situation for many regions of the world. Is it?

We are aware that the comparison of the derived potentials with actual livestock densities is not considering the feed composition which differs considerably between livestock production systems and agro-ecological zones. Here, we just wanted to highlight that the few regions with lower simulated LSU_{harv} values than reported are exactly those in which 'roadside grazing' or 'occasional feed' have high values in the feed baskets. We include a specification on P25L11:

'where feed baskets for ruminant livestock contain only minor shares of grass (Herrero et al., 2013).'

21) P25L11: And might be more importantly depending on the carbon-nutrient interactions.

We appreciate the reference to the importance of nutrients in relation to carbon and have to mention that neither nitrogen nor phosphorus limitations were considered so far. Since the publication of the implementation of the nitrogen cycle into LPJmL is currently under review (von Bloh et al., https://www.geosci-model-dev-discuss.net/gmd-2017-228/), we can shortly investigate also this aspect. Nevertheless, at the specific sentence (now P26L1), nutrients are not of major influence. As specified in the next sentence, the LSU_{harv} values are low in regions with either very low temperatures or low precipitation so that we did not change the text.

22) P25L27: and may also no external fertilization.

Since there was no line 27 on page 25, we assume that the comment refers to P27L27. Indeed, the chosen references report on areas without additional fertilization. We mention this in the sentence P28L2:
'when soil management did not include additional fertilization.'

23) P3L24: you mentioned in Sec. 4.2 that Chang et al., 2016 has applied a model at global scale.

This is correct and we have to mention this recent development in the introduction as well. The sentence at P3L23 is changed to
'While the implementation of grazing and mowing is demonstrated at the European scale, a recent application is combining satellite-derived productivity and model simulations at the global scale to derive historical changes in grassland management (Chang et al., 2016).'